BIG WATER TOWN
CULINARY WATER
MASTER PLAN UPDATE

July 2022

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I. INTRODUCTION

A. PREFACE

Big Water Town (the Town) has been experiencing added pressure on its resources due to growth opportunities in and around the town boundaries. The Town is located approximately 17 miles northwest of Page, AZ on US Highway 89, and approximately 4 miles west of Lake Powell. The Big Water Town economy is largely based upon recreational opportunities for tourists visiting the area to experience locations such as Lake Powell, the Glen Canyon National Recreation Area, the Grand Staircase Escalante National Monument, and the Vermillion Cliffs National Monument. The Glen Canyon Special Service District's (GCSSD) water system continues to reliably provide culinary water to the Town's residents along with new and proposed residential development, recreational resorts, and commercial developments. This plan updates the previously prepared Culinary Water Master Plan 2015 to account for recent growth and to make recommendations to accommodate future needs.

B. OVERVIEW

This Culinary Water Master Plan Update has been prepared for the Town of Big Water. To provide a better understanding of the existing water system, its components and existing financial situation, the Town has contracted with Sunrise Engineering, Inc. to conduct this study and provide recommendations for improvements to the culinary water system and updating user rates. This report will also serve as an Impact Fee Facilities Plan and provide a basis for an Impact Fee Analysis.

The culinary water system has been analyzed under the State of Utah Division of Drinking Water regulations to determine the current system status and to determine possible system upgrades as the community grows during the next 20 years. As part of this plan, Sunrise Engineering, Inc. has recommended improvements to the culinary water system and has developed a possible financing plan that will help Big Water obtain the necessary funds to maintain the existing water system and for funding the necessary recommended improvements.

The user rates are designed so that the accumulated water rates cover the expenses of the existing system as well as supporting the recommended system improvements. The recommended culinary water rates are fair and they are expected to allow Big Water to continue to maintain the level of service that is required of culinary water systems for the present time and over the 20-year planning period. We recommend the plan be reviewed annually and updated approximately every 5 years.

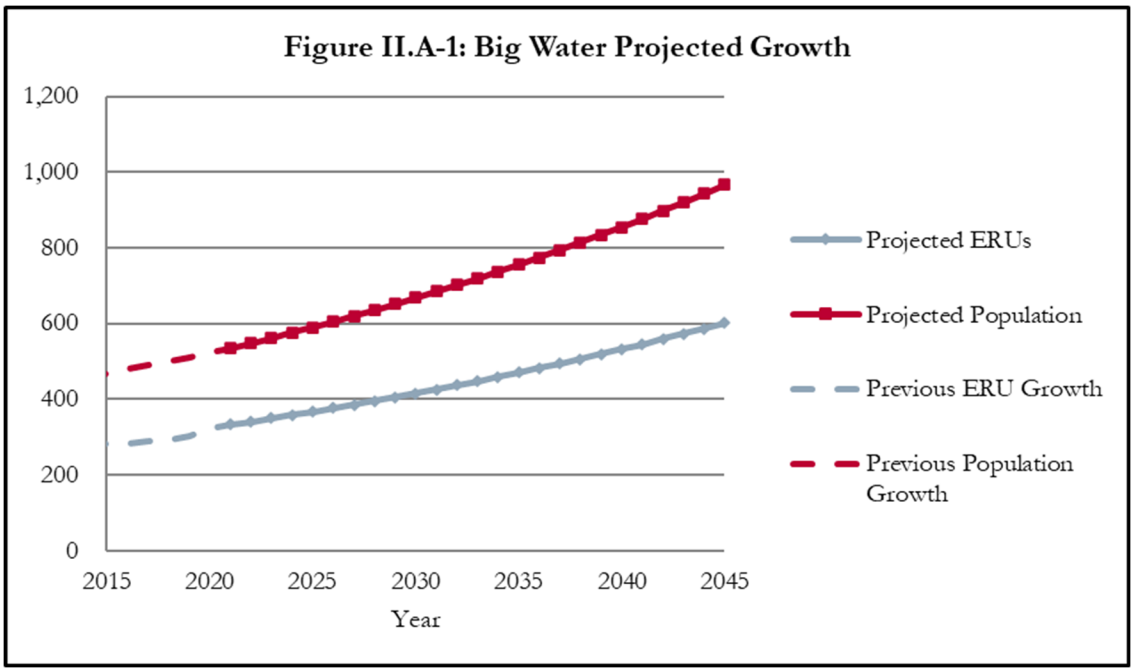
II. SYSTEM USERS ANALYSIS

A. PROJECTED GROWTH RATE

An important element in the development of a Culinary Water Master Plan is the projection of the Town's population growth rate. This projection gives the planner an idea of the future demands on the culinary water system for the length of the planning period.

Projecting the number of future culinary water connections is a subjective process. One method of estimating the number of future connections is by analyzing census records. Over the last decade, the Town has experienced both growth and losses to their population. The average yearly growth for the decade came out to 1.01%. Typically, this growth rate would then be used to project the anticipated growth of the Town moving forward but, after evaluating with the Town and comparing population growth rates to water connection growth rates, it has been determined that the past 6 years of growth are a more accurate representation of the Town's expected growth moving forward. Based on the past 6 years of growth, a future growth rate of 2.5% was used for this analysis.

The population figures in the service area and the percent increase each year back to the year 2015 is shown in Figure II.A-1. From 2015-2021, census records provide an estimate of the population per year. These estimates were used to show the estimated growth of the Town over the past 6 years.



While population growth is essential to anticipating water needs over a specific time period, eventually the available lots in the existing subdivisions will reach maximum capacity. If the maximum number of system connections is reached earlier or later than projected, future improvements to support growth may either come earlier or later. Since the Town will not likely reach its full capacity in the 20-year period, build out will not need to be considered in this report.

B. LENGTH OF PLANNING PERIOD

This Culinary Water Master Plan uses a 20-year planning period beginning in the year 2022 and running through the year 2042. This period will allow an adequate evaluation of the system for potential infrastructure improvements or other needs. Revenue sources should be carefully evaluated each year as budgets are set.

C. EXISTING CULINARY WATER CONNECTIONS

The State of Utah Public Drinking Water Regulations requires public water systems to meet requirements based upon usage. State rules provide a standard usage based upon the types of connections serviced in a system. Usage can also be based upon historical data if there is enough data to provide a confidence level of 90% or higher that the usage shown is representative of actual average use. Big Water has provided historic usage which will meet the confidence requirements outlined previously. The analysis of this historic usage will be outlined in this section.

According to data provided by Big Water, the total number of existing culinary connections in 2021 was 291. To calculate how much water is used by an average residential connection, the total amount of water used by all Big Water residential and commercial customers over the course of a year was determined. Table II.C-1 below provides historic data from Big Water records from 2018 to 2021. The average daily use per residential connection was calculated to be 325 gal/day for residential and 1,916 gal/day for commercial. In comparison to other communities of similar size and landscape, the daily average use for Big Water appears to be reasonable. Therefore, it is recommended that any future improvements be sized using a value of 325 gal/day per ERU. The remainder of this report will refer to this usage as historical usage and each section will include analysis showing requirements based upon this historic usage.

Table II.C-1: Average Usage Per Connection

	2018	2019	2020	2021	Average
Residential				(6 Months)	**18 - 21**
Usage (gallons)	38,859,000	30,509,000	32,840,000	13,362,000	33,020,000
Connections (ERUs)	256	265	282	291	274
Usage Per Connection (gal/year)	151,793	115,128	116,454	45,918	143,098
Daily Usage Per Connection (gal/day)	416	315	319	252	325
This master plan will use a historical daily ERU usage of					**325 gpd/conn.**
Commercial					
Usage (gallons)	12,656,000	16,589,000	12,831,000	6,580,000	16,218,667
Western Rock (WR) Usage (gallons)	7,912,410	11,226,604	8,554,000	4,386,667	9,165,623
Connections	25	25	28	28	27
Usage Per Connection (gal/year)	506,240	663,560	458,250	235,000	621,017
Daily Usage Per Connection (gal/day)	1,387	1,818	1,255	1,288	1,916
Usage Per Connection w/o WR (gal/year)	189,742	214,494	152,748	78,331	181,519
Daily Usage Per Connection w/o WR (gal/day)	520	588	418	429	**489**
Equivalent Residential Unit - Historical	4.27	5.59	3.86	3.96	5.90
Commercial ERUs - Historical	107	140	108	111	116
Equivalent Residential Unit - Historical w/o WR	1.60	1.81	1.29	1.32	**1.50**
Commercial ERUs - Historical w/o WR	40	45	36	37	40

*Water use for Western Rock is not available for 2020 and 2021. An estimated amount, based on previous years data, of 2/3 of the total commercial usage was used in these years instead.

Western Rock makes up a significant amount of the total commercial water usage. The average daily usage per commercial connection is 1,916 gal/day/ERU when Western Rock's usage is included in the calculations. Since the average usage of Western Rock is not expected to change significantly with the growth of the town during the planning horizon, their average usage has been removed from the total usage of commercial ERUs. This results in an average daily usage of 489 gal/day/ERU for commercial connections.

An Equivalent Residential Unit (ERU) equates a single residential connection. Using data provided by the Town, the total number of residential connections, or ERUs, was determined to be 291. As shown in Table II.C-1, the average residential connection uses approximately 325 gallons of water per day. This value then allows the comparison of water use between residential and any other type of connection. As explained previously, a commercial connection in the Town of Big Water uses approximately 489 gallons of water per day or 1.5 times the amount of an average residential connection. Therefore, throughout the of this report, each commercial connection equates to 1.5 ERUs. The Town's data indicated that there are rest currently 28 commercial connections. Using the factor explained previously, 28 commercial connections is equivalent to 42 residential connections for a total of 333 ERUs. This adjusted value is now an accurate representation of the amount of water used in the Town and can be used alongside the Town's average water usage rate of 325 gal/day/ERU.

During the three and a half-year span shown in Table II.C-1, the Town implemented the recommendations given in the Culinary Water Master Plan 2015. These improvements included refurbishing the existing East Tank, purchasing a backup generator to keep the well and tank operating in events of power outages, fixing pressure reducing valves that effect the southeast pressure zone, and purchasing and installing radio read meters and an electronic collection package. Each of these improvements helped to improve the system with the last improvements mentioned increasing the read accuracy of the water meters. This is one reason the usage appears to have a drastic decrease between 2018 and 2019.

D. PROJECTED CONNECTIONS AND ERUS

The number of future culinary ERUs can be calculated using the compound growth formula (shown below) and inserting the projected growth rate, the existing number of culinary water ERUs, and the 20-year planning period for culinary water improvements.

Present ERUs were taken from data provided by the Town; the total number of ERUs as of June 2021, in the Town was 291. Based on the assumed growth rate of 2.50%, the total number of ERUs at the end of the planning period will be 559. It is recommended that Big Water size all future culinary water related infrastructure improvements for at least 559 ERUs.

$$F = P(1 + i)^N$$

F = Future ERUs
P = Present ERUs
i = Projected Growth Rate
N = Years

Table II.D-1: Culinary Water Connections (At End of Each Year)

Year	Est. Growth Rate	Residential Connections	Commercial Connections	Residential ERU's	Commercial ERU's	Total ERU's	Estimated Population
2014		236	28	236	42	278	474
2015	2.65%	246	25	246	38	284	467
2016	-1.11%	241	27	241	41	282	480
2017	2.99%	250	26	250	39	289	492
2018	1.81%	256	25	256	38	294	499
2019	3.20%	265	25	265	38	303	511
2020	6.90%	282	28	282	42	324	523
2021	2.90%	291	28	291	42	333	535
2022	2.50%	298	29	298	43	341	548
2023	2.50%	306	29	306	44	350	562
2024	2.50%	313	30	313	45	359	576
2025	2.50%	321	31	321	46	368	591
2026	2.50%	329	32	329	48	377	605
2027	2.50%	337	32	337	49	386	620
2028	2.50%	346	33	346	50	396	636
2029	2.50%	355	34	355	51	406	652
2030	2.50%	363	35	363	52	416	668
2031	2.50%	373	36	373	54	426	685
2032	2.50%	382	37	382	55	437	702
2033	2.50%	391	38	391	56	448	720
2034	2.50%	401	39	401	58	459	738
2035	2.50%	411	40	411	59	471	756
2036	2.50%	421	41	421	61	482	775
2037	2.50%	432	42	432	62	494	794
2038	2.50%	443	43	443	64	507	814
2039	2.50%	454	44	454	66	519	834
2040	2.50%	465	45	465	67	532	855
2041	2.50%	477	46	477	69	546	877
2042	2.50%	489	47	489	71	559	899

III. WATER RIGHTS ANALYSIS

A. EXISTING WATER RIGHT

The existing water rights are currently owned by Glen Canyon Special Service District (GCSSD). The water rights are listed according to number, source, and flow in Table III.A-1.

Table III.A-1

Culinary Water Rights		Flow		
W.R. #	**Source**	**gpm**	**cfs**	**AcFt.**
89-1257	Underground Wells	898	2.00	1,447.93
89-1467	Underground Wells	449	1.0000	723.97
89-53	Underground Wells	1,122	2.5000	1,809.92
	Total Water Rights	**2,468**	**5.50**	**3981.8**

B. EXISTING REQUIRED WATER RIGHT

A 40-Year Water Rights Master Plan was conducted in 2013 to determine the required existing and projected water rights. This report has been included in Appendix D for reference. The report determined that the total water right required, or at approximately 392 ERUs, is 258 ac-ft. Please refer to the above-mentioned report for further analysis and explanation of required existing water rights.

C. PROJECTED REQUIRED WATER RIGHT

As mentioned previously, a 40-Year Water Rights Master Plan was conducted in 2013. It was determined that the 40-year water right required will be 2,073 ac-ft. In this plan, the 40-Year water right required is approximately 1,653 ERUs. Please refer to the above-mentioned report for further analysis and explanation of required future water rights.

D. RECOMMENDED WATER RIGHT IMPROVEMENTS

The Town has sufficient water rights for their current and future demands. There are no recommendations for improvements for the planning period of this study.

IV. WATER SOURCE CAPACITY ANALYSIS

A. EXISTING WATER SOURCE CAPACITY

To analyze source capacity, the yield capacity of the available water sources should be analyzed. The Town of Big Water currently has two wells with a combined flow of approximately 650 gallons per minute (gpm). These sources are listed in Table IV.A-1. The flow capacity numbers were acquired from Big Water.

Table IV.A-1

Big Water Sources	Total Flow	
Wells	**CFS**	**gpm**
North Well	0.7	300
South Well	0.8	350
Source Total =	**1.4**	**650**

Figure IV.A-1: Existing Wells

Water for the Town of Big Water is currently produced from two underground wells. The first well, the "North Well" or the "Highway Well", is located approximately 400 feet off Highway 89, about 1 mile northwest of Town. The second well, also known as the "South Well or "Water Tank Well" is located adjacent to the existing storage tanks. The North Well feeds water to the tank site directly through an 8" supply line, while the South Well feeds directly into the existing tank without the need of a supply line, due to the close proximity of the tank with respect to the well.

Following the previous master plan, the Town purchased a portable generator to provide backup power to the wells. Power connections to both the North and South Wells were upgraded to accommodate connection to the generator.

B. EXISTING REQUIRED WATER SOURCE CAPACITY

The State of Utah Public Drinking Water Regulations, Section 5, states that a community should have an adequate water source capacity to physically meet the anticipated peak day demand. State regulations outline that peak day demand for source capacity requirement per connection should be

double the average amount of water required per connection per day. This master plan assumes that the peak day demand in the Big Water service area for source capacity is double the average requirement per ERU based on historic use. The required source capacity per ERU in the Big Water service area is assumed to be 650 gallons per day (gpd) for historical use. The existing required source capacity calculations are shown in Table IV.B-1.

Table IV.B-1

Existing Required Water Source Capacity Calculations								
Required Indoor/Outdoor Source - Historic Usage								
333	ERUs X	650 gpd / ERU	X	1 day / 24 hr	X	1 hr / 60 min.	= 150	gpm
Western Rock Demand							37	gpm
	Existing Culinary System Source Capacity Surplus						**463**	**gpm**

The existing source capacity surplus or deficit is determined by subtracting the existing required source capacity of 187 gpm from the total available source capacity of 650 gpm, which yields a surplus of 463 gpm.

C. PROJECTED REQUIRED WATER SOURCE CAPACITY

The projected required water source capacity at the end of the planning period is determined from the same information and calculations explained in Part B, except the projected number of culinary water ERUs for 2042 is substituted in the calculations for the current number of ERUs. The projected required source capacity calculations are shown in Table IV.C-1.

Table IV.C-1

Projected Required Source Capacity Calculations								
Required Indoor/Outdoor Source - Historic Usage								
559	ERUs X	650 gpd / ERU	X	1 day / 24 hr	X	1 hr / 60 min.	= 252	gpm
Western Rock Demand							37	gpm
	Projected Culinary System Source Capacity Surplus						**361**	**gpm**

The projected source capacity surplus or deficit is determined by subtracting the projected required source capacity of 289 gpm from the total available source capacity of 650 gpm, which yields a projected surplus of 361 gpm at the 20-year projection.

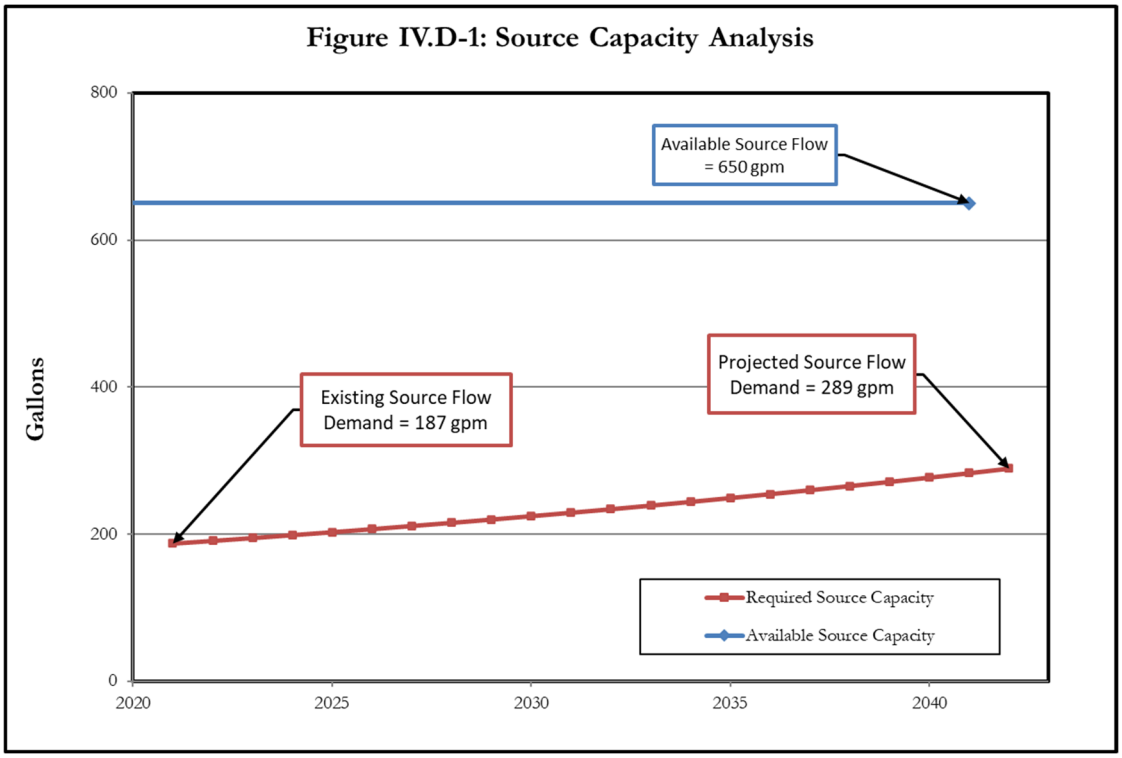
D. RECOMMENDED WATER SOURCE CAPACITY IMPROVEMENTS

The calculations in this section demonstrate that Big Water currently has sufficient source capacity. However, it is recommended that all wells undergo proper maintenance and repairs to be able to run at full capacity.

It is also recommended that the Town plan for routine maintenance of the wells and have replacement parts on hand.

Figure IV.D-1 represents a comparison between the current water source capacity and the projected required peak day demand flows over the planning period.

Figure IV.D-1: Source Capacity Analysis



Although the analysis shows adequate source capacity, the Town may wish to pursue an additional well that would supply water solely to the Western Rock pit. Drilling a new well near the gravel pit would remove a large part of the impact from the Town's wells, storage tanks, and distribution lines. Ownership of the well, water rights change application, sizing and capacity would all need to be evaluated.

V. WATER STORAGE CAPACITY ANALYSIS

A. EXISTING WATER STORAGE CAPACITY

The culinary water storage facilities and their capacities are identified in Table V.A-1.

Table V.A-1

Existing Storage Capacity:		
West Tank	100,000	gal.
East Tank	400,000	gal.
Total Existing Storage Capacity	**500,000**	**gal.**

There are currently two existing water storage tanks in the Big Water area. The "East" tank and the "West" tank are located adjacent to each other approximately 0.90 miles southeast of Highway 89 along the northern portion of Town. The West Tank had a leakage problem that has recently been repaired bringing it back online for the system.

Figure V.A-1: East & West Tank

B. EXISTING REQUIRED WATER STORAGE CAPACITY

Water storage capacity requirements are found in the State of Utah Public Drinking Water Regulations, R309-510. These regulations require storage for a community's culinary water system to meet one full day's average use requirement for all connections in the community in addition to fire flows for a minimum of two hours and emergency storage as deemed necessary.

As shown in previous sections, the average water usage per ERU in the area for 2018-2021 is 325 gallons per day of culinary water for indoor and outdoor use. Storage requirements for fire

protection vary slightly from community to community. In general, fire flow requirements are set by the local Fire Chief or are based on building size and type of construction. The statewide minimum fire flow is 1,000 gpm. This is also the minimum fire flow requirements given by Big Water. Also included in required storage is emergency storage as recommended by Sunrise Engineering and accepted by the Town. For planning purposes, this master plan will use an amount of 25% of the total required storage from equalization and fire protection storage.

Based on the requirements for required storage capacity, the required storage capacity is calculated as shown in Table V.B-1.

Table V.B-1

Existing Required Storage Capacity									
	325 gpd / ERU	X	333 ERUs	=			108,225	gpd
Fire Demand									
1,000 gpm	X	60 min / 1 hr	X	2 hr	=		120,000	gpd.
Emergency Supply									
25% of required storage							57,056	gpd	
Western Rock Demand									
Average Day Demand							26,539	gpd	
						Total Existing Required Storage	311,820	gpd	
						Total Existing Storage Capacity	500,000	gpd	
						Existing Storage Capacity Surplus	188,180	gpd	

The existing water storage capacity surplus or deficit is determined by subtracting the existing required water storage capacity of 311,820 gallons from the total available water storage capacity of 500,000 gallons, which yields an existing surplus of 188,810 gallons.

C. PROJECTED REQUIRED WATER STORAGE CAPACITY

The projected required culinary water storage capacity at the end of the planning period is determined from the same factors explained in part B above, but the projected number of culinary water ERUs is inserted into the calculations in place of the current number of ERUs.

Based on the requirements for required storage capacity, the projected storage capacity is calculated as shown in Table V.B-2.

Table V.B-2

Projected Required Storage Capacity in 2042								
	325 gpd / ERU	X	559	ERUs	=	181,773	gpd
Fire Flow								
1,000 gpm	X	60 min / 1 hr	X	2 hr	=	120,000	gpd
Emergency Supply								
25% of required storage						75,443	gpd
Western Rock Demand								
Average Day Demand						26,539	gpd
					Total Required Storage	403,755	gpd
					Total Existing Storage Capacity	500,000	gpd
					Future Storage Capacity Surplus	96,245	gpd

The projected water storage capacity surplus or deficit is determined by subtracting the projected required water storage capacity of 403,755 gallons from the total available water storage capacity of 500,000 gallons, which yields a projected surplus of 96,245 gallons at 20 years.

D. RECOMMENDED WATER STORAGE CAPACITY IMPROVEMENTS

Big Water is anticipated to have sufficient storage through the planning horizon as can be seen in Figure V.E-1. If, however, more development occurs than projected, the current storage could become inadequate. At the end of the planning horizon, it is anticipated future analyses will propose an additional tank to increase storage capacity of the town. When choosing a location for a new tank it is important to take elevation into account. The State of Utah Public Drinking Water Regulations require that a minimum of 40 psi of pressure be maintained during peak day demand at all points in the system. The current system has a few connections near the existing tanks with static pressures less than 40 psi. Cost of a new tank in the past was not justified for these limited connections, but a new tank should be constructed at an elevation that will provide the required pressure to this low-pressure area. Images of the water model have been included in the Appendix to show both potential growth areas and pressure levels from the current tanks elevations.

Big Water should review their storage needs every five years to ensure that they continue to provide enough storage for the culinary water system.

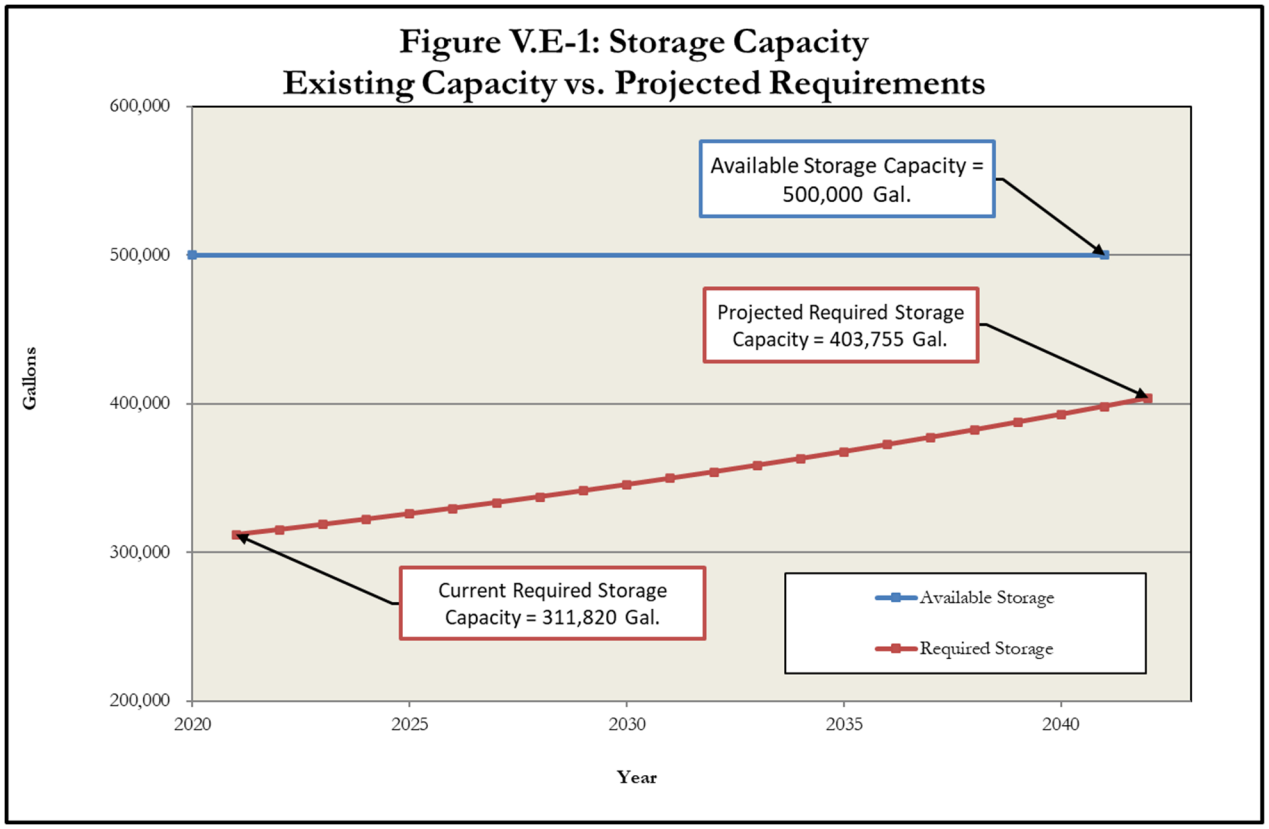


Figure V.E-1: Storage Capacity
Existing Capacity vs. Projected Requirements
600,000
500,000
400,000
300,000
200,000
Gallons
2020
2025
2030
2035
2040
Year
Available Storage Capacity = 500,000 Gal.
Projected Required Storage Capacity = 403,755 Gal.
Current Required Storage Capacity = 311,820 Gal.
Available Storage
Required Storage

VI. WATER TREATMENT REQUIREMENTS

A. GENERAL REQUIREMENTS

The State of Utah Public Drinking Water Regulations, in accordance with the National Safe Drinking Water Act, have adopted "primary" regulations for the protection of public health and "secondary" regulations related to taste and aesthetics. The regulations recommend that all culinary water sources have provisions for continuous disinfection. Big Water has a water treatment facility to treat most of the City's existing wells to ensure that the culinary water meets minimum requirements.

B. EXISTING TREATMENT FACILITIES

At present, culinary water entering the tank system is being chlorinated by an automated chlorination tablet unit. The well water does not require and does not receive any further treatment beyond chlorination.

Figure VI.B-1: West Tank

C. RECOMMENDED WATER TREATMENT FACILITY IMPROVEMENTS

It is recommended that the Town plan for routine maintenance of the wells and have replacement parts on hand.

VII. WATER DISTRIBUTION SYSTEM ANALYSIS

A. EXISTING DISTRIBUTION SYSTEM ANALYSIS

The State of Utah Public Drinking Water Regulations, R309-105-9, require that no connection experience less than 20 psi at any time during operation of the system. The regulations also require that the distribution system be sized to maintain 20 psi during peak day conditions with fire flow demands, 30 psi during conditions of peak instantaneous demand, and 40 psi during peak day demand. As a general guideline, it is desirable that the system be able to provide a minimum static pressure of 50 psi at every point in the distribution system.

Existing peak flows are calculated as shown in Table VII.A-1. The equation to calculate the peak instantaneous demand is found in the State of Utah Public Drinking Water Regulations, rule R309-510-9. This equation can also be found in Table VII.A-1. The State of Utah Public Drinking Water Regulations, rule R309-510-9 provides a location-based flow rate of 9.04 gpm per irrigated acre for the outdoor peak instantaneous demand. The 0.08 irrigated acres per ERU was determined by taking an average lawn size from a random sample of existing homes in Big Water. As stated in the source capacity analysis, peak day flows are equal to twice the average day flow. The State regulation for fire flow requires a minimum of 1,000 gpm if no recommendation has been provided by the local fire authority. New State regulations require all fire hydrants to be served from 8-inch diameter or larger pipelines unless it can be proven through the use of modeling that 6-inch lines are sufficient.

Table VII.A-1: Existing Distribution Demands

Existing Distribution Requirement (Historical Usage):							
Indoor Peak Instantaneous Demand:							
Q=	10.8 X N^.64			N= Number of ERU's			
Q=	10.8 X	333	^.64		=	444	gpm
Outdoor Peak Instantaneous Demand: Q = N X Irr. Acre/ERU X gpm/Irr. Acre							
Q=	333 ERU X	0.08 acre / ERU	X	9.04 gpm / irr. acre	=	241	gpm
	Current Peak Instantaneous Demand				=	**685**	**gpm**
Peak Day Demand & Fire Flow							
All ERUs							
333 ERUs X	650 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	150	gpm
Western Rock Demand							
	55,280 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	38	gpm
	Fire Flow				=	1,000	gpm
	Current Peak Day Demand + Fire Flow+ Wester Rock				=	**1,189**	**gpm**

The existing Big Water culinary water distribution system has been modeled using the computer program InfoWater® by Innovyze. There are currently three pressure zones, one for the northern portion of town, one for the southern portion of town west of Highway 89, and one for the

southern portion of town east of Highway 89. The model results show that each of the existing pressure zones and the system as a whole meets the above-mentioned requirements for peak instantaneous demands, peak day demands, and peak day with fire demand. The results from the InfoWater® analysis of the existing system is provided in Appendix C. Also, the existing distribution system and hydrants can be seen in Exhibit VII.A-1.

B. PROJECTED DISTRIBUTION SYSTEM ANALYSIS

The projected distribution system analysis is performed using the same assumptions as in the existing system analysis, except that the projected number of ERUs is inserted into the calculations. The calculations for the projected distribution demands are shown in Table VII.B-1.

Table VII.B-1: Projected Distribution Demands

Distribution Requirement for projected 20 year growth (Historic Usage):						
Indoor Peak Instantaneous Demand:						
Q=	10.8 X N^.64			N= Number of ERU's		
Q=	10.8 X	559 ^.64			=	619 gpm
Outdoor Peak Instantaneous Demand: Q = N X Irr. Acre/ERU X gpm/Irr. Acre						
Q=	559 ERU X	0.08 acre / conn.	X	9.04 gpm / irr. acre	=	404 gpm
	Projected Peak Instantaneous Demand				=	**1,024 gpm**
Peak Day Demand & Fire Flow						
All ERUs						
559 ERUs X	650 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	252 gpm
Western Rock Demand						
	55,280 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	38 gpm
	Fire Flow				=	1,000 gpm
	Projected Peak Day Demand + Fire Flow				=	**1,291 gpm**

Using each of the above listed flows the water system model was used to analyze the existing culinary water system. The model results again show that each of the existing pressure zones and the system as a whole will meet future peak instantaneous demands, peak day demands, and peak day demands with fire demand. The results from the InfoWater® analysis of the proposed system are provided in Appendix C.

It should be noted that if greater than anticipated growth occurs, the distribution system should be modeled to ensure proper service. It is also recommended that any future developments, large or small, be modeled to ensure proper service. It should also be noted that approvals aren't required if the Town has an engineer of record to model new improvements.

C. RECOMMENDED DISTRIBUTION SYSTEM IMPROVEMENTS

There are no recommendations to help improve the current system. However, it is recommended that any future developments are added and modeled with the current water model to ensure that the system can support the proposed development and to ensure there are no adverse impacts on the system from said developments.

It is recommended that the Town develop construction design standards and require new developments to follow those standards during the construction process.

VIII. FUTURE GROWTH

A. UNDER CANVAS RESORT

In 2020, a resort company called Under Canvas bought land above the existing tanks and established a resort complete with a restaurant, laundry facilities, and lodging accommodations in the form of tents. The resort is provided water from the Town's tanks using a booster pump and therefore adds an additional strain on the storage and source capacity capabilities of the Town, but does not provide additional strain on the distribution system. The following summary is taken from a report provided to the State Division of Drinking Water for plan approval.

It is anticipated that the resort will use 11,648 gallons per day or approximately 8.09 gallons per minute. Table VIII.A-1 provides a summary of the effects of the resorts demands on each system component. The calculated current and future surplus of each component was used to show the additional anticipated impacts of the resort on the system.

Table VIII.A-1

Under Canvas Resort Demands		
Anticipated Yearly Demand	13.1	Ac.Ft.
ADD	11,661	gpd
	8.10	gpm
Water Rights	Surplus/(Deficit)	
Current	3,831	Ac.Ft.
Future	3,748	Ac.Ft.
Current w/ Under Canvas	**3,818**	**Ac.Ft.**
Future w/ Under Canvas	**3,735**	**Ac.Ft.**
Source Capacity	Surplus/(Deficit)	
Current	463	gpm
Future	361	gpm
Current w/ Under Canvas	**455**	**gpm**
Future w/ Under Canvas	**353**	**gpm**
Storage	Surplus/(Deficit)	
Current	188,180	gallons
Future	96,245	gallons
Current w/ Under Canvas	**188,167**	**gallons**
Future w/ Under Canvas	**96,232**	**gallons**

B. BASE CAMP RV PARK

It is anticipated that Base Camp RV Park will be built within the next few years. This resort will be built to the southwest of Highway 89 and will connect to the existing southwest pressure zone off Yankee Doodle Drive. At the writing of this report, the park has currently proposed a total of 130 RV pads.

Due to a lack of information regarding anticipated water usage for the park, numbers from the State of Utah's code R309-510 were used in calculating expected demand. The code provides a table that compares a seasonal unit's peak day demand with a single Equivalent Residential Connection (ERC). The average ERC uses 800 gpd whereas a Recreational Vehicle Park uses 100 gpd/pad. With 130 anticipated RV pads, this would equate to approximately 17 ERCs.

The anticipated demand for the RV park would then be 5,525 gallons per day or approximately 3.84 gallons per minute. Table VIII.B-1 provides a summary of the effects of the resorts demands on each system component. The calculated current and future surplus of each component was used to show the additional anticipated impacts of the RV park on the system.

Table VIII.B-1

Base Camp RV Park Demands		
Anticipated Yearly Demand	6.2	Ac.Ft.
ADD	5,525	gpd
	3.84	gpm
Water Rights	Surplus/(Deficit)	
Current	3,831	Ac.Ft.
Future	3,748	Ac.Ft.
Current w/ Base Camp	**3,818**	**Ac.Ft.**
Future w/ Base Camp	**3,735**	**Ac.Ft.**
Source Capacity	Surplus/(Deficit)	
Current	463	gpm
Future	361	gpm
Current w/ Base Camp	**455**	**gpm**
Future w/ Base Camp	**353**	**gpm**
Storage	Surplus/(Deficit)	
Current	188,180	gallons
Future	96,245	gallons
Current w/ Base Camp	**188,167**	**gallons**
Future w/ Base Camp	**96,232**	**gallons**
Distribution System	Surplus/(Deficit)	
Current PDD	1,189	gpm
Future PDD	1,291	gpm
Current w/ Base Camp	**1,197**	**gpm**
Future w/ Base Camp	**1,299**	**gpm**

C. SUMMARY

With the addition of these developments, it is important to verify that the system can reasonably sustain the anticipated demands now and in the future. Table VIII.C-1 shows the combined effects of the resorts on the system. The current and future surplus of each component of the system was used again to show the additional impacts of both resorts as a whole.

Table VIII.C-1

Combined Demands on System		
Anticipated Yearly Demand	19.3	Ac.Ft.
ADD	17,186	gpd
	11.93	gpm
Water Rights	Surplus/(Deficit)	
Current	3,831	Ac.Ft.
Future	3,748	Ac.Ft.
Current w/ Base Camp	**3,812**	**Ac.Ft.**
Future w/ Base Camp	**3,729**	**Ac.Ft.**
Source Capacity	Surplus/(Deficit)	
Current	463	gpm
Future	361	gpm
Current w/ Base Camp	**451**	**gpm**
Future w/ Base Camp	**349**	**gpm**
Storage	Surplus/(Deficit)	
Current	188,180	gallons
Future	96,245	gallons
Current w/ Base Camp	**170,994**	**gallons**
Future w/ Base Camp	**79,059**	**gallons**
Distribution System	Surplus/(Deficit)	
Current PDD	1,189	gpm
Future PDD	1,291	gpm
Current w/ Base Camp	**1,201**	**gpm**
Future w/ Base Camp	**1,303**	**gpm**

As can be seen in each analysis, the addition of one resort or both does not exceed the capacity of any various components of the water system. Therefore, there are no additional recommendations to help improve the current water system aside from the recommendations made previously. If changes are proposed to increase either resort, additional analyses will be required to determine the capacity of the system to support the additions.

With the potential for new growth, it is recommended that the Town develop construction design standards and require new developments to follow those standards during construction.

IX. SUMMARY OF RECOMMENDED SYSTEM IMPROVEMENTS

D. RECOMMENDED IMPROVEMENTS LIST

A brief summary of recommended improvements includes the following items:

Water Rights

1. No recommendations for the current planning period.

Water Source

1. Plan for routine maintenance of the wells and have replacement parts on hand. Although not required, the Town may consider acquiring a well near the Western Rock pit that could be a dedicated source for the gravel pit.

Water Storage

1. No recommendation for the current planning period.

Water Treatment

1. Plan for routine maintenance of the treatment system and have replacement parts on hand.

Water Distribution

1. Evaluate proposed new developments by modeling proposed improvements to verify distribution needs.

Future Growth

1. Develop construction design standards and require new developments to follow those standards.

E. POTENTIAL FINANCING PLAN

No financing is needed for the recommendations suggested. Future updates to this analysis may recommend other improvements to which financing will be looked at in more detail.

X. WATER RATE ANALYSIS

A. GENERAL

Generally, water rates are a combination of base rates and overage rates wherein the base rate is charged to all connections in the system, whether or not water is used, and should cover all fixed costs of the system. Overage rates are normally set to encourage water conservation, but should always cover all variable costs of the system. It should be noted that Big Water has a large number of standby connections that for the most part, do not use water even on an intermittent basis. There are approximately 100 of these connections. Each of these connections, though not consuming water, should be assessed a separate fee, such as a Standby Connection fee. The current established service fee rate structure for Big Water is shown in Table X.A-1.

Table X.A-1: Existing Water Rate Structure

TABLE V.C-2		
Town of Big Water		
Existing Residential Water Rate Structure		
Base Rate	$22.50	per ERU/Month
Total Rate	$22.50	per ERU/Month
Includes	10,000	Gallons
Overage Steps		
Cost Per 1,000 Gal.	Low Gallons	High Gallons
$1.23	10,001	15,000
$1.40	15,001	20,000
$1.60	20,001	30,000
$2.14	30,001	50,000
$2.21	50,001	& Up
Usage	Rates	
(Gallons)	Existing Rates	
0	$ 22.50	
15,000	$ 28.65	
20,000	$ 35.65	
30,000	$ 51.65	
50,000	$ 94.45	

B. AVERAGE RATE DETERMINATION FOR FY2022

Table X.B-1 shows a method used to determine the average water rate per ERU which should be divided among all system customers. Since there are no recommended improvements for this analysis, the average water rate per ERU is intended to cover the cost of operating and maintaining the current system.

Annual revenues must be sufficient to cover the expenses incurred by the construction, maintenance, and administration of the water system. These expenses include debt service, utilities, personnel salaries and benefits, system maintenance, legal and professional fees, and other

miscellaneous items. It is strongly recommended that the water department maintain a funded depreciation account and/or a replacement fund to provide the money necessary for replacement and repair of water department facilities and pipelines.

In the most recent budget completed to date, the total water revenues budget in 2021 was $140,000. This amount is divided by the estimated number of billable ERUs in the system that year, 333, and again by 12 months, resulting in $35.04 per ERU per month. This is the average total water revenue per month per billable ERU connected to the system in 2021.

Additionally, Kane County assesses and annual fee of $115 per lot withing the service area of the Glen Canyon SSD. Over the past 3 years this has resulted in an average revenue of a little over $60,000 per year to the system. We understand that this revenue is to be used to offset the annual expenses to the system, and therefore should be included in the calculation for the required average user rate per user.

Based on the calculations shown in Table X.B-1, the average water revenue per residential connection (1 ERU) for a newly adopted rate structure for the year 2022 would need to be approximately **$38.25**. It is estimated that this income would allow Big Water to pay the debt and operations costs associated with the culinary water system.

Table X.B-1: Potential Financing Plan 2022

TOWN OF BIG WATER			
FY 2022 FINANCING PLAN			
TOTAL PROJECT COST			**$ -**
FY 2022 EXPENSES			
Proposed Funding:	**Rate**	**Term in Yrs.**	**Principal**
TOTAL PROJECT FUNDING:			**$ -**
EXPENSES: (First Year)			
Salaries, wages and benefits			$71,429
Other Expenses			$99,792
		Subtotal Expenses:	**$171,221**
EXISTING DEBT SERVICE			
2016 Loan DWB			**$50,318.53**
Loan Reserve (Payment/10)			**$5,031.85**
		Subtotal Existing Annual Debt Service:	**$55,350**
NEW DEBT SERVICE			
		Subtotal New Annual Debt Service:	**$ -**
Renewal and Replacement Fund (5% of Annual Expenses)			$8,561
		GRAND TOTAL EXPENSES:	**$235,132**
ANNUAL INCOME			
Projected Yearly Impact Fees Received			$17,816
Annual Kane County Assessment (Annual fee per lot)			$115.00
Revenue from Annual Assessment			$60,631
Total Number Of ERU's			341
Average Monthly Water User Rate/ERU			**$38.25**
		TOTAL ANNUAL INCOME:	**$174,501**

C. BASE AND OVERAGE RATE DETERMINATION

This study includes separating the average user rate into base and overage rates and investigates possible rate structures that would promote conservation and work hand-in-hand with drought management policies. In order to determine a base and overage schedule, the projected expenses of the water system for FY2022 have been separated into fixed and variable expenses (Table X.C-1). It is recommended that the base rate should cover the fixed expenses of the system. Table X.C-1 suggests a possible scenario for determining base and overage rates for Big Water. Included in the base rate is $28.20 for fixed costs and $10.05 for variable costs. This rate scenario simply identifies base and overage rates that should satisfy the revenue requirements based on estimated operation and maintenance (O&M) expenses and on projected water usage. The Town of Big Water is able to set the rate structure to any amount it deems to be fair. However, the rates should be such that the system remains financially viable.

Table X.C-1: Fixed Rate Analysis

TOWN OF BIG WATER FIXED RATE ANALYSIS			
FY 2022 Expenses	**Fixed**	**Variable**	**Total**
Salaries, wages and benefits	$71,429	$0	$71,429
Other Expenses	$29,938	$69,855	$99,792
EXISTING DEBT SERVICE			
2016 Loan DWB	$50,319	$0	$50,319
Loan Reserve (Payment/10)	$5,032	$0	$5,032
NEW DEBT SERVICE			
Renewal & Replacement Fund	$4,281	$4,281	$8,561
Total Expenses:	$160,997	$74,135	**$235,132**
Impact Fee Income	$0	$17,816	$17,816
County Assessment	$45,473	$15,158	$60,631
Total Expenses - Impact Fees - KC Assessment	$115,524	$41,162	$156,686
Total Projected System ERUs in FY2022	341	341	341
Monthly Cost/ERU in FY2022	$28.20	$10.05	**$38.25**

Big Water will need to determine a rate schedule that will result in revenues that will average $38.25/ERU/month in order to provide the necessary culinary water system improvements as recommended in this Plan and to maintain the level of O&M needed for the system. The base and overage rates should be examined each year to ensure that enough revenue is being generated to cover the expenses. This rate should also be reviewed when an actual financing plan has been established.

D. POSSIBLE RATE STRUCTURE

Tables X.D-1 through X.D-3 represent three different possible changes to the Town's rate structure. The overage rate structure is stepped to promote conservation by charging a higher amount for excessive water usage. The three structures also vary in terms of how many gallons of water are included in the base rate. By including no water or a small amount of base gallons, residents have a greater incentive to conserve water.

The tables also include some examples of water bills based on the proposed rate structure being proportional to the meter size and show bills based on existing rates for comparison. The best way to confirm that the average rate produced will cover annual expenses is to implement the structure and evaluate the results after a full year of use.

Finally, it is common for water base rates to vary based on meter size. This helps to account for the impact and larger demands that commercial and other large users place on a community's water system. This study recommends that Big Water consider implementation of a graduated base rate based on meter size.

The average usage by a single residential user, usually a ¾" meter, is approximately 10,075 gallons per month. Using any of the water rate structures below, a single ERU would be charged approximately $38.25 if the average monthly usage of 10,075 gallons is met.

Tables X.D-1 through X.D-3: Possible Water Rate Structures

TABLE X.D-1

TOWN OF BIG WATER
Possible Water Rate Structure

Meter (in.)	Base Rate (ERU/Month)
3/4"	$28.00
1"	$45.00
1 1/2"	$85.00
2"	$130.00
4"	$390.00
Includes	0 Gallons

Overage Steps

Cost Per 1,000 Gal.	Low Gallons	High Gallons
$1.10	1	10,000
$1.35	10,001	20,000
$1.75	20,001	30,000
$2.25	30,001	& Up

Example Monthly Rates for Specific Usages

(Gallons)	New Rate	Old Rate
0	$ 28.00	$ 22.50
5,000	$ 33.50	$ 22.50
10,000	$ 39.00	$ 22.50
25,000	$ 61.25	$ 43.65
50,000	$ 115.00	$ 94.45

TABLE X.D-2

TOWN OF BIG WATER
Possible Water Rate Structure

Meter (in.)	Base Rate (ERU/Month)
3/4"	$ 33.50
1"	$54.00
1 1/2"	$100.00
2"	$155.00
4"	$470.00
Includes	5,000 Gallons

Overage Steps

Cost Per 1,000 Gal.	Low Gallons	High Gallons
$1.10	5,001	10,000
$1.35	10,001	20,000
$1.75	20,001	30,000
$2.25	30,001	& Up

Example Monthly Rates for Specific Usages

(Gallons)	New Rate	Old Rate
0	$ 33.50	$ 22.50
7,500	$ 36.25	$ 22.50
10,000	$ 39.00	$ 22.50
25,000	$ 61.25	$ 43.65
50,000	$ 115.00	$ 94.45

TABLE X.D-3

TOWN OF BIG WATER
Possible Water Rate Structure

Meter (in.)	Base Rate (ERU/Month)
3/4"	$ 38.50
1"	$62.00
1 1/2"	$115.00
2"	$180.00
4"	$540.00
Includes	10,000 Gallons

Overage Steps

Cost Per 1,000 Gal.	Low Gallons	High Gallons
$1.35	10,001	15,000
$1.50	15,001	20,000
$1.80	20,001	30,000
$2.25	30,001	& Up

Example Monthly Rates for Specific Usages

(Gallons)	New Rate	Old Rate
0	$38.50	$ 22.50
10,000	$ 38.50	$ 22.50
17,000	$ 48.25	$ 31.45
25,000	$ 61.75	$ 43.65
50,000	$ 115.75	$ 94.45

XI. IMPACT FEE ANALYSIS

A. EXISTING IMPACT FEE

Existing Culinary Water Impact Fees for Big Water are set at $2,140 per ERU. This value was set prior to the 2016 version of this document and was not updated to accommodate the recommended projects or expected growth.

B. PROPOSED IMPACT FEE

The Culinary Water Master Plan outlines demands to be placed on the system by growth and development. This plan does not recommend any large improvements, primarily focusing on maintaining the system and keeping back up parts on hand. Many of the improvements needed to accommodate growth were completed in 2016 when the water system was purchased from Glen Canyon Special Service District. These improvements were paid for with a loan from the Division of Drinking Water (DDW) for a total of $1,052,000. Of this loan, it has been determined that $507,665 is impact fee eligible. That equals 48% of the original loan amount. Table XI.B-1 shows the original amount of the loan as well as the impact fee eligible amount. The proposed impact fee per ERU is found by dividing the loan by the projected growth of ERU's within the 20-year planning horizon. Since 2016, this loan has been paid down to a principal amount of $952,000.

The proposed impact fee number in Table XI.B-1 represents the maximum amount that can be charged per ERU. This value of $2,329 is greater than the current impact fee. It is up to the Town Council to determine the actual rate that will be charged.

TABLE XI.B-1
IMPACT FEE ANALYSIS FY2021/2022
CULINARY WATER MASTER PLAN
TOWN OF BIG WATER

12-Jan-22

EXISTING DEBT SERVICE	P&I	% Eligible	Eligible
Utah DDW Loan	$ 1,052,000	48%	$ 507,665
	Existing Impact Fee Eligible Cost:		$ 507,665

PROPOSED IMPROVEMENT PROJECTS

Total Estimated New Project Cost		$ -
% Of New Project Cost Due to New Growth	0%	$ -
Interest from New Debt Service	0%	$ -
Impact Fee Eligible Cost		$ -
No. of ERUs (2022)		341
20-Year Projected ERUs (2042)		559
No. of New ERU's Due to Growth		218
Total Impact Fee Eligible Cost		$ 507,665
Proposed Culinary Water Impact Fee for Big Water (2022)		**$ 2,329** /ERU.

Existing Impact Fee (2021) $ 2,140 /ERU.

Meter Size	Cross-Sectional Area (in^2)	% Area Increase	Impact Fee
3/4"	0.44	0%	$ 2,329
1"	0.79	80%	$ 4,182
1 1/2"	1.77	124%	$ 9,370
2"	3.14	297%	$ 16,622
4"	12.57	1491%	$ 66,541

APPENDIX A

A. GROWTH & USER ANALYSIS

Month & Year	Water Usage Data				Connection Data		
	Residential	Commercial	Other	Total	Residential	Commercial	Other
Jan-18	1,251,957	185,852		1,437,809			
Feb-18	1,232,792	218,710		1,451,502			
Mar-18	1,414,199	252,648		1,666,847			
Apr-18	3,178,933	1,967,463		5,146,396			
May-18	3,914,106	732,314		4,646,420			
Jun-18	5,751,453	526,151		6,277,604			
Jul-18	6,196,692	2,349,189		8,545,881	256	25	
Aug-18	5,594,218	2,082,905		7,677,123	256	25	
Sep-18	4,675,714	1,921,269		6,596,983	256	25	
Oct-18	2,651,817	1,121,005		3,772,822	256	25	
Nov-18	1,509,611	1,034,547		2,544,158	256	25	
Dec-18	1,487,342	263,576		1,750,918	256	25	
Jan-19	1,177,007	232,425		1,409,432	265	25	
Feb-19	919,248	215,697		1,134,945	265	25	
Mar-19	1,430,157	827,248		2,257,405	265	25	
Apr-19	2,414,476	2,022,636		4,437,112	265	25	
May-19	3,001,395	1,601,626		4,603,021	265	25	
Jun-19	3,726,667	1,611,825		5,338,492	265	25	
Jul-19	4,635,138	2,179,524		6,814,662	265	25	
Aug-19	4,644,018	1,815,926		6,459,944	265	25	
Sep-19	4,005,262	2,408,822		6,414,084	265	25	
Oct-19	2,337,638	1,763,150		4,100,788	265	25	
Nov-19	1,191,366	1,574,331		2,765,697	265	25	
Dec-19	1,026,745	336,245		1,362,990	265	25	
Jan-20	905,978	1,260,241		2,166,219	282	28	
Feb-20	997,466	2,337,394		3,334,860	282	28	
Mar-20	1,110,199	1,912,965		3,023,164	282	28	
Apr-20	2,035,080	1,704,793		3,739,873	282	28	
May-20	3,462,962	990,451		4,453,413	282	28	
Jun-20	4,364,746	981,825		5,346,571	282	28	
Jul-20	4,464,111	731,887		5,195,998	282	28	
Aug-20	5,569,925	959,159		6,529,084	282	28	
Sep-20	4,360,480	616,089		4,976,569	282	28	
Oct-20	3,056,521	502,407		3,558,928	282	28	
Nov-20	1,408,742	462,473		1,871,215	282	28	
Dec-20	1,103,859	371,078		1,474,937	282	28	
Jan-21	1,167,967	3,363,876		4,531,843	291	28	
Feb-21	937,103	235,950		1,173,053	291	28	
Mar-21	1,180,945	210,721		1,391,666	291	28	
Apr-21	2,444,098	308,182		2,752,280	291	28	
May-21	3,237,580	1,348,276		4,585,856	291	28	
Jun-21	4,394,302	1,112,812		5,507,114	291	28	
Total	**98,826,575**	**44,772,525**	**0**	**143,599,100**			

Year	Yearly Usage in 1,000 Gallons				Average Yearly Connections		
2018	38,859	12,656	0	51,514	256	25	
2019	30,509	16,589	0	47,099	265	25	
2020	32,840	12,831	0	45,671	282	28	
2021	13,362	6,580	0	19,942	291	28	

Year	Monthly Averages by Year				Winter Averages (Dec, Jan, & Feb)		
2018 Avg	6,476,500	2,109,333	0	8,586	1,195	237	
2019 Avg	2,542,417	1,382,417	0	3,925	977	1,311	
2020 Avg	2,736,667	1,069,250	0	3,806	1,070	1,324	
2021 Avg	2,227,000	1,096,667	0	3,324			

Year	Average Usage Per Connection			
	Residential		Commercial	
	Monthly	Daily	Monthly	Daily
2018	25,299	832	84,373	2,774
2019	9,594	315	55,297	1,818
2020	9,704	319	38,188	1,255
2021	7,653	252	39,167	1,288

	2018	2019	2020	2021	Average
Residential				(6 Months)	**18 - 21**
Usage (gallons)	38,859,000	30,509,000	32,840,000	13,362,000	33,020,000
Connections (ERUs)	256	265	282	291	274
Usage Per Connection (gal/year)	151,793	115,128	116,454	45,918	143,098
Daily Usage Per Connection (gal/day)	416	315	319	252	325
This master plan will use a historical daily ERU usage of					**325 gpd/conn.**
Commercial					
Usage (gallons)	12,656,000	16,589,000	12,831,000	6,580,000	16,218,667
Western Rock (WR) Usage (gallons)	7,912,410	11,226,604	8,554,000	4,386,667	9,165,623
Connections	25	25	28	28	27
Usage Per Connection (gal/year)	506,240	663,560	458,250	235,000	621,017
Daily Usage Per Connection (gal/day)	1,387	1,818	1,255	1,288	1,916
Usage Per Connection w/o WR (gal/year)	189,742	214,494	152,748	78,331	181,519
Daily Usage Per Connection w/o WR (gal/day)	520	588	418	429	**489**
Equivalent Residential Unit - Historical	4.27	5.59	3.86	3.96	5.90
Commercial ERUs - Historical	107	140	108	111	116
Equivalent Residential Unit - Historical w/o WR	1.60	1.81	1.29	1.32	**1.50**
Commercial ERUs - Historical w/o WR	40	45	36	37	40

*Year 2021 represent 6 months worth of data, therefore adjustments were used when determining averages to indude this year but not skew the results.

**Water use for Western Rock is not available for 2020 and 2021. An estimated amount, based on previous years, of 2/3 of the total commercial usage was used in these years instead.

Year	Est. Growth Rate	Residential Connections	Commercial Connections	Residential ERU's	Commercial ERU's	Total ERU's	Estimated Population
2014		236	28	236	42	278	474
2015	2.65%	246	25	246	38	284	467
2016	-1.11%	241	27	241	41	282	480
2017	2.99%	250	26	250	39	289	492
2018	1.81%	256	25	256	38	294	499
2019	3.20%	265	25	265	38	303	511
2020	6.90%	282	28	282	42	324	523
2021	2.90%	291	28	291	42	333	535
2022	2.50%	298	29	298	43	341	548
2023	2.50%	306	29	306	44	350	562
2024	2.50%	313	30	313	45	359	576
2025	2.50%	321	31	321	46	368	591
2026	2.50%	329	32	329	48	377	605
2027	2.50%	337	32	337	49	386	620
2028	2.50%	346	33	346	50	396	636
2029	2.50%	355	34	355	51	406	652
2030	2.50%	363	35	363	52	416	668
2031	2.50%	373	36	373	54	426	685
2032	2.50%	382	37	382	55	437	702
2033	2.50%	391	38	391	56	448	720
2034	2.50%	401	39	401	58	459	738
2035	2.50%	411	40	411	59	471	756
2036	2.50%	421	41	421	61	482	775
2037	2.50%	432	42	432	62	494	794
2038	2.50%	443	43	443	64	507	814
2039	2.50%	454	44	454	66	519	834
2040	2.50%	465	45	465	67	532	855
2041	2.50%	477	46	477	69	546	877
2042	2.50%	489	47	489	71	559	899

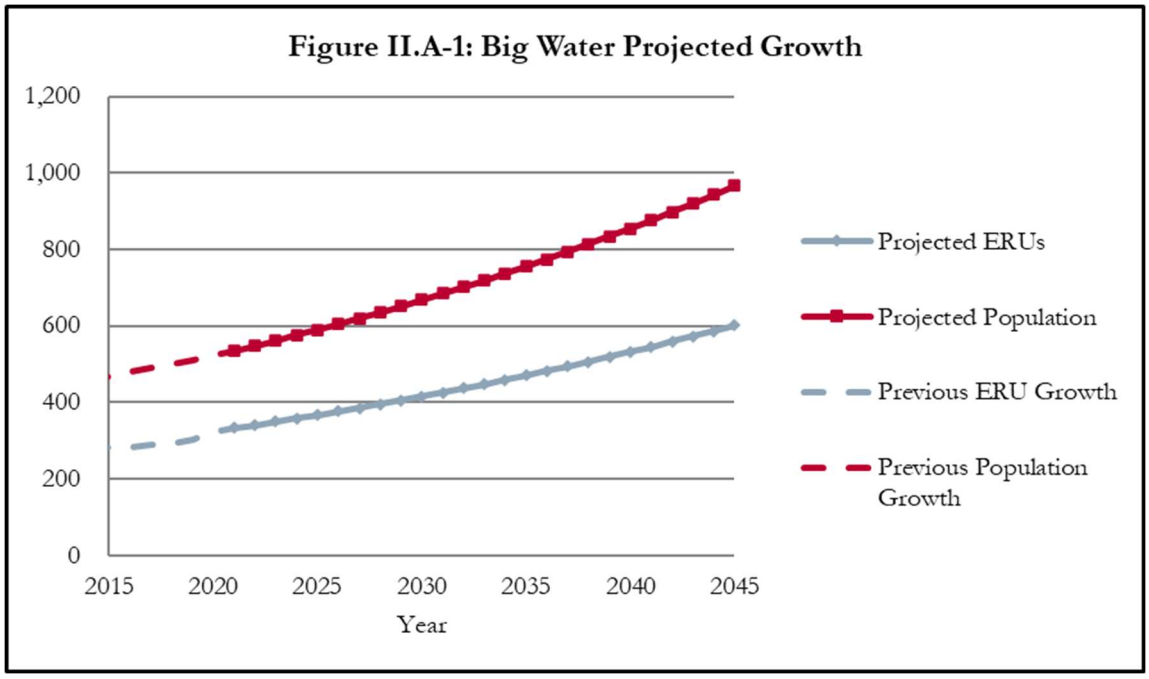


Figure II.A-1: Big Water Projected Growth
1,200
1,000
800
600
400
200
0
2015
2020
2025
2030
2035
2040
2045
Year
Projected ERUs
Projected Population
Previous ERU Growth
Previous Population Growth

APPENDIX B

B. FIVE POINT ANALYSIS

Big Water Sources	Total Flow	
Wells	**CFS**	**gpm**
North Well	0.7	300
South Well	0.8	350
Source Total =	**1.4**	**650**

Existing Required Water Source Capacity Calculations

Required Indoor/Outdoor Source - Historic Usage

333	ERUs X	650	gpd X	1	day X	1	hr	=	150 gpm
			ERU	24	hr	60	min.		

Western Rock Demand 37 gpm

Existing Culinary System Source Capacity Surplus **463 gpm**

Projected Required Source Capacity Calculations

Required Indoor/Outdoor Source - Historic Usage

559	ERUs X	650	gpd X	1	day X	1	hr	=	252 gpm
			ERU	24	hr	60	min.		

Western Rock Demand 37 gpm

Projected Culinary System Source Capacity Surplus **361 gpm**

Existing Storage Capacity:		
West Tank	100,000	gal.
East Tank	400,000	gal.
Total Existing Storage Capacity	**500,000**	**gal.**

Existing Required Storage Capacity

		325	gpd	X	333	ERUs	=	108,225	gpd
			ERU						
Fire Demand									
1,000	gpm	X	60	min	X		2 hr =	120,000	gpd.
			1	hr					
Emergency Supply									
25% of required storage								57,056	gpd
Western Rock Demand									
Average Day Demand								26,539	gpd
							Total Existing Required Storage	311,820	gpd
							Total Existing Storage Capacity	500,000	gpd
							Existing Storage Capacity Surplus	188,180	gpd

Projected Required Storage Capacity in 2042

		325	gpd	X	559	ERUs	=	181,773	gpd
			ERU						
Fire Flow									
1,000	gpm	X	60	min	X		2 hr =	120,000	gpd
			1	hr					
Emergency Supply									
25% of required storage								75,443	gpd
Western Rock Demand									
Average Day Demand								26,539	gpd
							Total Required Storage	403,755	gpd
							Total Existing Storage Capacity	500,000	gpd
							Future Storage Capacity Surplus	96,245	gpd

Existing Distribution Requirement (Historical Usage):

Indoor Peak Instantaneous Demand:

Q= 10.8 X N^.64 N= Number of ERU's

Q= 10.8 X 333 ^.64 = 444 gpm

Outdoor Peak Instantaneous Demand: Q = N X Irr. Acre/ERU X gpm/Irr. Acre

Q= 333 ERU X $\frac{0.08 \text{ acre}}{\text{ERU}}$ X $\frac{9.04 \text{ gpm}}{\text{irr. acre}}$ = 241 gpm

Current Peak Instantaneous Demand = 685 gpm

Peak Day Demand & Fire Flow

All ERUs

333 ERUs X $\frac{650 \text{ gpd}}{\text{ERU}}$ X $\frac{1 \text{ day}}{24 \text{ hr}}$ X $\frac{1 \text{ hr}}{60 \text{ min.}}$ = 150 gpm

Western Rock Demand

$\frac{55{,}280 \text{ gpd}}{\text{ERU}}$ X $\frac{1 \text{ day}}{24 \text{ hr}}$ X $\frac{1 \text{ hr}}{60 \text{ min.}}$ = 38 gpm

Fire Flow = 1,000 gpm

Current Peak Day Demand + Fire Flow+ Wester Rock = 1,189 gpm

Distribution Requirement for projected 20 year growth (Historic Usage):

Indoor Peak Instantaneous Demand:

Q= 10.8 X N^.64 N= Number of ERU's

Q= 10.8 X 559 ^.64 = 619 gpm

Outdoor Peak Instantaneous Demand: Q = N X Irr. Acre/ERU X gpm/Irr. Acre

Q= 559 ERU X $\frac{0.08 \text{ acre}}{\text{conn.}}$ X $\frac{9.04 \text{ gpm}}{\text{irr. acre}}$ = 404 gpm

Projected Peak Instantaneous Demand = 1,024 gpm

Peak Day Demand & Fire Flow

All ERUs

559 ERUs X $\frac{650 \text{ gpd}}{\text{ERU}}$ X $\frac{1 \text{ day}}{24 \text{ hr}}$ X $\frac{1 \text{ hr}}{60 \text{ min.}}$ = 252 gpm

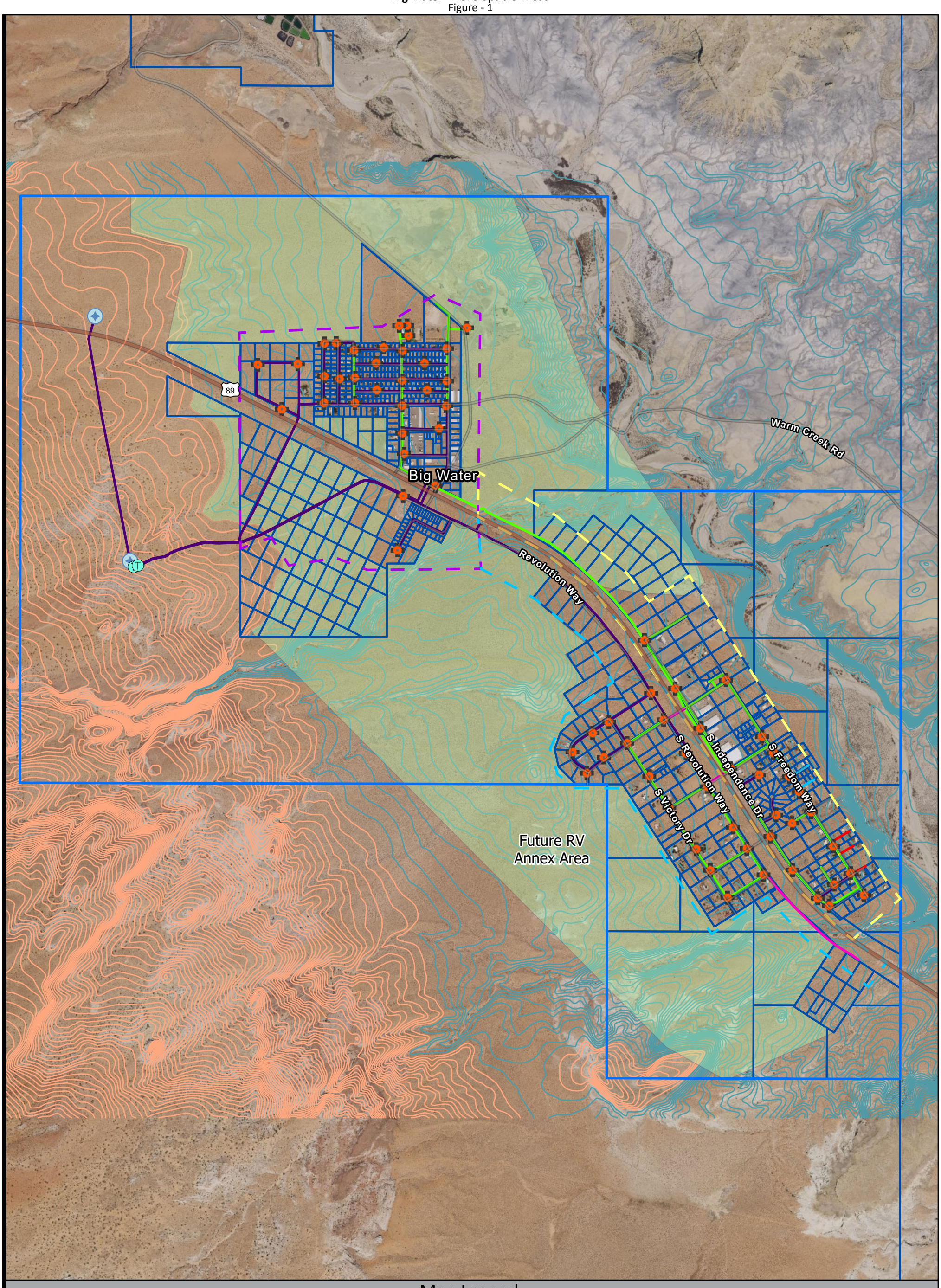
Western Rock Demand

$\frac{55{,}280 \text{ gpd}}{\text{ERU}}$ X $\frac{1 \text{ day}}{24 \text{ hr}}$ X $\frac{1 \text{ hr}}{60 \text{ min.}}$ = 38 gpm

Fire Flow = 1,000 gpm

Projected Peak Day Demand + Fire Flow = 1,291 gpm

Big Water - Developable Areas
Figure - 1



Map Legend

- Water Hydrants
- Water Tanks
- Production Well
- Water Lateral Lines
- 2" Water Mains
- 3" Water Mains
- 4" Water Mains
- 6" Water Mains
- 8" Water Mains
- 10" Water Mains
- 10ft Contours 40psi or Less
- 10ft Contours 40psi or grater
- Water Pressure Zone 1
- Water Pressure Zone 2
- Water Pressure Zone 3
- Potential Growth Areas with More than 40 psi
- Parcels
- Big Water Municipality

N W E S

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SEI NO.	DESIGNED	DRAWN	CHECKED
08165	MG	CD	DS

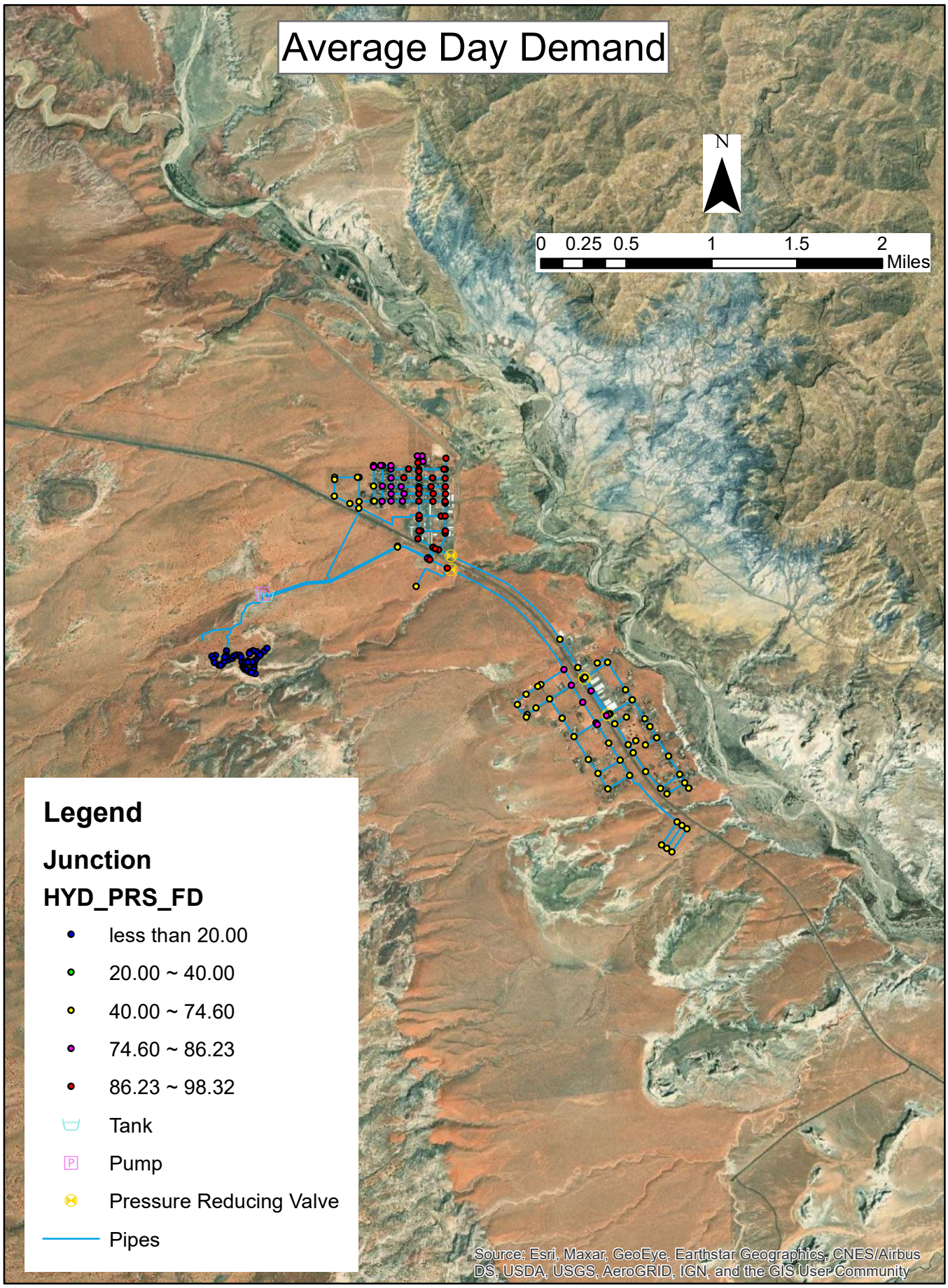
Figure 1
Updated 01/18/2022

SUNRISE ENGINEERING

APPENDIX C

C. INFOWATER BY INNOVYZE

[See the following maps and tables below]


Average Day Demand
N
0 0.25 0.5 1 1.5 2
Miles
Legend
Junction
HYD_PRS_FD
less than 20.00
20.00 ~ 40.00
40.00 ~ 74.60
74.60 ~ 86.23
86.23 ~ 98.32
Tank
Pump
Pressure Reducing Valve
Pipes
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

AVERAGE DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	☐	J10	0.74	4,262.82	4,353.89	39.46
2	☐	J100	0.74	4,166.00	4,353.69	81.33
3	☐	J102	0.74	4,156.00	4,353.69	85.66
4	☐	J104	0.74	4,137.00	4,353.69	93.89
5	☐	J106	0.74	4,166.00	4,353.69	81.33
6	☐	J108	0.74	4,153.00	4,353.69	86.96
7	☐	J110	0.74	4,163.00	4,353.69	82.63
8	☐	J112	0.74	4,089.00	4,353.69	114.69
9	☐	J114	0.74	4,103.00	4,353.69	108.62
10	☐	J116	0.74	4,102.00	4,353.69	109.06
11	☐	J118	0.74	4,103.00	4,353.69	108.62
12	☐	J12	0.74	4,257.80	4,353.82	41.61
13	☐	J120	0.74	4,137.00	4,353.69	93.89
14	☐	J122	0.74	4,144.00	4,353.69	90.86
15	☐	J124	0.74	4,187.00	4,353.70	72.23
16	☐	J126	0.74	4,188.00	4,353.70	71.80
17	☐	J128	0.74	4,184.00	4,353.70	73.53
18	☐	J130	0.74	4,197.00	4,353.70	67.90
19	☐	J132	0.74	4,203.00	4,353.70	65.30
20	☐	J134	0.74	4,199.00	4,353.70	67.03
21	☐	J136	0.74	4,187.00	4,353.70	72.23
22	☐	J138	0.74	4,199.00	4,353.70	67.03
23	☐	J14	0.74	4,178.20	4,353.74	76.06
24	☐	J140	0.74	4,267.81	4,353.89	37.30
25	☐	J142	0.74	4,258.22	4,353.82	41.42
26	☐	J144	0.74	4,179.00	4,353.74	75.71
27	☐	J146	0.74	4,135.17	4,353.71	94.69
28	☐	J148	0.74	4,123.00	4,353.70	99.96
29	☐	J150	0.74	4,154.00	4,353.70	86.53
30	☐	J152	0.74	4,132.00	4,353.70	96.06
31	☐	J154	0.74	4,124.00	4,353.69	99.53
32	☐	J156	0.74	4,047.00	4,287.81	104.34
33	☐	J158	0.74	4,039.00	4,287.51	107.68
34	☐	J16	0.74	4,134.00	4,353.71	95.20
35	☐	J160	0.74	4,035.00	4,287.40	109.36
36	☐	J162	0.74	4,036.00	4,197.55	70.00
37	☐	J164	0.74	4,008.00	4,197.55	82.13
38	☐	J166	0.74	4,022.00	4,197.55	76.07
39	☐	J168	0.74	4,012.00	4,197.55	80.40
40	☐	J170	0.74	4,010.00	4,197.55	81.26
41	☐	J174	0.74	4,007.00	4,197.55	82.56
42	☐	J176	0.74	4,002.00	4,197.54	84.73
43	☐	J178	0.74	3,997.00	4,197.54	86.90
44	☐	J18	0.74	4,123.00	4,353.70	99.96
45	☐	J180	0.74	4,003.00	4,197.54	84.30
46	☐	J182	0.74	3,992.00	4,197.54	89.06
47	☐	J186	0.74	3,989.00	4,197.54	90.36
48	☐	J188	0.74	3,985.00	4,197.54	92.09
49	☐	J190	0.74	3,987.00	4,197.54	91.23
50	☐	J192	0.74	4,018.00	4,197.54	77.80
51	☐	J194	0.74	4,016.00	4,197.54	78.66

AVERAGE DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
52		J196	0.74	4,021.00	4,197.54	76.50
53		J198	0.74	4,020.00	4,197.54	76.93
54		J20	0.74	4,124.00	4,353.69	99.52
55		J200	0.74	4,022.00	4,197.55	76.06
56		J202	0.74	4,018.00	4,197.55	77.80
57		J204	0.74	4,029.00	4,197.55	73.03
58		J206	0.74	4,018.00	4,197.55	77.80
59		J208	0.74	4,037.00	4,197.55	69.57
60		J210	0.74	4,036.00	4,197.55	70.00
61		J212	0.74	4,037.00	4,287.10	108.37
62		J214	0.74	4,036.00	4,287.30	108.89
63		J216	0.74	4,055.00	4,287.09	100.56
64		J218	0.74	4,046.00	4,287.09	104.46
65		J22	0.74	4,110.00	4,353.69	105.59
66		J220	0.74	4,079.00	4,287.08	90.16
67		J222	0.74	4,076.00	4,287.08	91.46
68		J224	0.74	4,078.00	4,287.08	90.60
69		J226	0.74	4,103.00	4,287.08	79.76
70		J228	0.74	4,136.00	4,287.08	65.46
71		J230	0.74	4,127.00	4,287.08	69.36
72		J232	0.74	4,108.00	4,287.08	77.60
73		J234	0.74	4,129.00	4,287.08	68.50
74		J236	0.74	4,052.00	4,287.09	101.86
75		J238	0.74	4,049.00	4,287.09	103.17
76		J24	0.74	4,111.00	4,353.69	105.16
77		J240	0.74	4,048.00	4,287.09	103.60
78		J242	0.74	4,077.00	4,287.08	91.03
79		J244	0.74	4,085.00	4,287.08	87.56
80		J246	0.74	4,063.00	4,287.06	97.08
81		J248	0.74	4,063.00	4,287.07	97.09
82		J250	0.74	4,040.00	4,287.07	107.06
83		J252	0.74	4,036.00	4,287.06	108.78
84		J254	0.74	4,038.00	4,287.04	107.91
85		J256	0.74	4,075.00	4,287.05	91.88
86		J258	0.74	4,104.00	4,353.69	108.19
87		J26	0.74	4,128.00	4,353.69	97.79
88		J260	0.74	4,029.00	4,287.03	111.80
89		J262	0.74	4,023.00	4,287.03	114.40
90		J264	0.74	4,020.00	4,287.02	115.70
91		J266	0.74	3,980.00	4,287.02	133.03
92		J268	0.74	3,975.00	4,287.02	135.20
93		J270	0.74	3,976.00	4,287.02	134.77
94		J272	0.74	3,999.00	4,287.02	124.80
95		J274	0.74	4,047.12	4,287.10	103.98
96		J278	0.74	4,148.00	4,353.69	89.13
97		J28	0.74	4,129.00	4,353.69	97.36
98		J280	0.74	4,142.00	4,353.69	91.73
99		J282	0.74	4,131.00	4,353.69	96.49
100		J284	0.74	4,130.00	4,353.69	96.93
101		J286	0.74	4,127.80	4,353.69	97.88
102		J288	0.74	4,187.12	4,353.70	72.18

AVERAGE DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
103		J290	3.52	3,998.00	4,287.02	125.23
104		J292	0.00	3,994.00	4,287.02	126.96
105		J294	3.52	4,003.00	4,287.02	123.06
106		J296	3.52	4,014.00	4,287.02	118.30
107		J298	3.52	4,019.00	4,287.02	116.13
108		J30	0.74	4,130.00	4,353.69	96.93
109		J300	3.52	4,024.00	4,287.02	113.97
110		J302	0.00	4,330.00	4,353.99	10.40
111		J304	0.00	4,331.00	4,353.99	9.96
112		J306	0.00	4,336.00	4,617.18	121.83
113		J308	0.00	4,342.00	4,617.18	119.23
114		J310	0.00	4,349.00	4,617.17	116.20
115		J312	0.00	4,357.00	4,617.17	112.73
116		J314	0.00	4,370.00	4,617.17	107.10
117		J316	0.00	4,388.00	4,617.17	99.30
118		J318	0.00	4,394.00	4,617.17	96.70
119		J32	0.74	4,128.00	4,353.69	97.79
120		J320	0.00	4,402.00	4,617.17	93.23
121		J322	0.00	4,413.00	4,617.17	88.47
122		J326	0.00	4,425.00	4,617.17	83.27
123		J328	0.00	4,430.00	4,617.17	81.10
124		J330	0.00	4,433.00	4,617.17	79.80
125		J332	0.00	4,450.00	4,617.17	72.43
126		J334	0.00	4,473.00	4,617.17	62.47
127		J336	0.00	4,492.00	4,617.17	54.24
128		J338	0.60	4,499.00	4,617.17	51.20
129		J34	0.74	4,128.00	4,353.69	97.79
130		J340	0.00	4,454.00	4,617.17	70.70
131		J342	0.00	4,456.00	4,617.17	69.83
132		J344	0.00	4,466.00	4,617.16	65.50
133		J346	0.00	4,464.00	4,617.16	66.36
134		J348	0.00	4,472.00	4,617.14	62.89
135		J350	0.00	4,476.00	4,617.14	61.15
136		J352	0.00	4,476.00	4,617.14	61.15
137		J354	0.00	4,476.00	4,617.13	61.15
138		J356	0.00	4,475.00	4,617.13	61.59
139		J36	0.74	4,110.00	4,353.69	105.59
140		J362	0.00	4,477.00	4,617.14	60.72
141		J366	0.03	4,498.00	4,617.14	51.62
142		J368	0.03	4,502.00	4,617.14	49.89
143		J370	0.03	4,502.00	4,617.14	49.89
144		J372	0.03	4,502.00	4,617.14	49.89
145		J374	0.03	4,497.00	4,617.14	52.05
146		J376	0.03	4,492.00	4,617.14	54.22
147		J378	0.03	4,496.00	4,617.14	52.49
148		J38	0.74	4,107.00	4,353.69	106.89
149		J380	0.03	4,484.00	4,617.14	57.69
150		J382	0.23	4,470.00	4,617.13	63.75
151		J384	0.00	4,465.00	4,617.13	65.92
152		J386	0.00	4,461.00	4,617.13	67.65
153		J388	0.00	4,456.00	4,617.13	69.82

AVERAGE DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
154	☐	J390	0.00	4,454.00	4,617.13	70.68
155	☐	J392	0.00	4,457.00	4,617.12	69.38
156	☐	J394	0.00	4,454.00	4,617.12	70.68
157	☐	J396	0.00	4,439.00	4,617.12	77.18
158	☐	J398	0.00	4,427.00	4,617.12	82.38
159	☐	J40	0.74	4,103.00	4,353.69	108.62
160	☐	J400	0.00	4,434.00	4,617.12	79.35
161	☐	J402	0.00	4,415.00	4,617.12	87.58
162	☐	J404	0.00	4,409.00	4,617.12	90.18
163	☐	J406	0.00	4,400.00	4,617.12	94.08
164	☐	J408	0.00	4,394.00	4,617.12	96.68
165	☐	J410	0.00	4,412.00	4,617.12	88.88
166	☐	J412	0.00	4,418.00	4,617.12	86.28
167	☐	J414	0.00	4,427.00	4,617.12	82.38
168	☐	J416	0.00	4,429.00	4,617.12	81.51
169	☐	J418	0.00	4,440.00	4,617.12	76.75
170	☐	J42	0.74	4,103.00	4,353.69	108.62
171	☐	J420	0.00	4,461.00	4,617.12	67.65
172	☐	J422	0.00	4,461.00	4,617.12	67.65
173	☐	J424	0.00	4,461.00	4,617.12	67.65
174	☐	J426	0.00	4,459.00	4,617.12	68.51
175	☐	J428	0.00	4,456.00	4,617.12	69.81
176	☐	J430	0.00	4,418.00	4,617.12	86.28
177	☐	J432	0.00	4,451.00	4,617.12	71.98
178	☐	J434	0.00	4,450.00	4,617.12	72.41
179	☐	J436	0.00	4,444.00	4,617.12	75.01
180	☐	J438	0.00	4,438.00	4,617.12	77.61
181	☐	J44	0.74	4,113.00	4,353.69	104.29
182	☐	J440	0.00	4,438.00	4,617.12	77.61
183	☐	J442	0.00	4,451.00	4,617.17	72.00
184	☐	J444	0.00	4,476.00	4,617.14	61.15
185	☐	J446	0.03	4,482.00	4,617.14	58.55
186	☐	J448	0.00	4,410.00	4,617.12	89.75
187	☐	J450	0.00	4,445.00	4,617.12	74.58
188	☐	J452	0.00	4,438.00	4,617.12	77.61
189	☐	J456	0.00	4,439.00	4,617.12	77.18
190	☐	J46	0.74	4,123.00	4,353.69	99.96
191	☐	J48	0.74	4,101.00	4,353.69	109.49
192	☐	J50	0.74	4,122.00	4,353.69	100.39
193	☐	J52	0.74	4,116.00	4,353.69	102.99
194	☐	J54	0.74	4,098.00	4,353.69	110.79
195	☐	J56	0.74	4,096.00	4,353.69	111.66
196	☐	J58	0.74	4,112.00	4,353.69	104.72
197	☐	J60	0.74	4,109.00	4,353.69	106.02
198	☐	J62	0.74	4,092.00	4,353.69	113.39
199	☐	J64	0.74	4,092.00	4,353.69	113.39
200	☐	J66	0.74	4,108.00	4,353.69	106.46
201	☐	J68	0.74	4,102.00	4,353.69	109.06
202	☐	J70	0.74	4,110.00	4,353.69	105.59
203	☐	J72	0.74	4,109.00	4,353.69	106.02
204	☐	J74	0.74	4,119.00	4,353.69	101.69

AVERAGE DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
205	☐	J76	0.74	4,134.00	4,353.69	95.19
206	☐	J78	0.74	4,139.00	4,353.69	93.02
207	☐	J80	0.74	4,142.00	4,353.69	91.72
208	☐	J82	0.74	4,142.00	4,353.69	91.72
209	☐	J84	0.74	4,143.00	4,353.69	91.29
210	☐	J86	0.74	4,135.00	4,353.69	94.76
211	☐	J88	0.74	4,131.00	4,353.69	96.49
212	☐	J90	0.74	4,132.00	4,353.69	96.06
213	☐	J92	0.74	4,126.00	4,353.69	98.66
214	☐	J94	0.74	4,117.00	4,353.69	102.56
215	☐	J96	0.74	4,130.00	4,353.69	96.92
216	☐	J98	0.74	4,143.00	4,353.69	91.29

PEAK DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	☐	J10	1.61	4,262.82	4,353.53	39.30
2	☐	J100	1.61	4,166.00	4,352.74	80.92
3	☐	J102	1.61	4,156.00	4,352.74	85.25
4	☐	J104	1.61	4,137.00	4,352.73	93.48
5	☐	J106	1.61	4,166.00	4,352.74	80.92
6	☐	J108	1.61	4,153.00	4,352.74	86.55
7	☐	J110	1.61	4,163.00	4,352.74	82.21
8	☐	J112	1.61	4,089.00	4,352.73	114.27
9	☐	J114	1.61	4,103.00	4,352.73	108.21
10	☐	J116	1.61	4,102.00	4,352.73	108.64
11	☐	J118	1.61	4,103.00	4,352.73	108.21
12	☐	J12	1.61	4,257.80	4,353.26	41.36
13	☐	J120	1.61	4,137.00	4,352.73	93.48
14	☐	J122	1.61	4,144.00	4,352.74	90.45
15	☐	J124	1.61	4,187.00	4,352.78	71.83
16	☐	J126	1.61	4,188.00	4,352.77	71.40
17	☐	J128	1.61	4,184.00	4,352.77	73.13
18	☐	J130	1.61	4,197.00	4,352.77	67.50
19	☐	J132	1.61	4,203.00	4,352.78	64.90
20	☐	J134	1.61	4,199.00	4,352.77	66.63
21	☐	J136	1.61	4,187.00	4,352.77	71.83
22	☐	J138	1.61	4,199.00	4,352.78	66.63
23	☐	J14	1.61	4,178.20	4,352.94	75.72
24	☐	J140	1.61	4,267.81	4,353.53	37.14
25	☐	J142	1.61	4,258.22	4,353.27	41.18
26	☐	J144	1.61	4,179.00	4,352.90	75.35
27	☐	J146	1.61	4,135.17	4,352.75	94.28
28	☐	J148	1.61	4,123.00	4,352.68	99.52
29	☐	J150	1.61	4,154.00	4,352.68	86.09
30	☐	J152	1.61	4,132.00	4,352.74	95.65
31	☐	J154	1.61	4,124.00	4,352.74	99.11
32	☐	J156	1.10	4,047.00	4,287.42	104.17
33	☐	J158	1.10	4,039.00	4,287.03	107.47
34	☐	J16	1.61	4,134.00	4,352.81	94.81
35	☐	J160	1.10	4,035.00	4,286.89	109.14
36	☐	J162	1.10	4,036.00	4,197.55	70.00
37	☐	J164	1.10	4,008.00	4,197.55	82.13
38	☐	J166	1.10	4,022.00	4,197.55	76.06
39	☐	J168	1.10	4,012.00	4,197.55	80.40
40	☐	J170	1.10	4,010.00	4,197.54	81.26
41	☐	J174	1.10	4,007.00	4,197.54	82.56
42	☐	J176	1.10	4,002.00	4,197.54	84.73
43	☐	J178	1.10	3,997.00	4,197.54	86.89
44	☐	J18	1.61	4,123.00	4,352.76	99.56
45	☐	J180	1.10	4,003.00	4,197.54	84.29
46	☐	J182	1.10	3,992.00	4,197.54	89.06
47	☐	J186	1.10	3,989.00	4,197.53	90.36
48	☐	J188	1.10	3,985.00	4,197.53	92.09
49	☐	J190	1.10	3,987.00	4,197.53	91.22
50	☐	J192	1.10	4,018.00	4,197.53	77.79
51	☐	J194	1.10	4,016.00	4,197.53	78.66

PEAK DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
52		J196	1.10	4,021.00	4,197.54	76.49
53		J198	1.10	4,020.00	4,197.54	76.93
54		J20	1.61	4,124.00	4,352.73	99.11
55		J200	1.10	4,022.00	4,197.54	76.06
56		J202	1.10	4,018.00	4,197.54	77.79
57		J204	1.10	4,029.00	4,197.55	73.03
58		J206	1.10	4,018.00	4,197.55	77.80
59		J208	1.10	4,037.00	4,197.55	69.57
60		J210	1.10	4,036.00	4,197.55	70.00
61		J212	1.10	4,037.00	4,286.55	108.13
62		J214	1.10	4,036.00	4,286.77	108.66
63		J216	2.79	4,055.00	4,286.61	100.35
64		J218	2.79	4,046.00	4,286.59	104.25
65		J22	1.61	4,110.00	4,352.73	105.18
66		J220	2.79	4,079.00	4,286.57	89.94
67		J222	2.79	4,076.00	4,286.59	91.25
68		J224	2.79	4,078.00	4,286.59	90.38
69		J226	2.79	4,103.00	4,286.58	79.55
70		J228	2.79	4,136.00	4,286.58	65.24
71		J230	2.79	4,127.00	4,286.57	69.14
72		J232	2.79	4,108.00	4,286.57	77.37
73		J234	2.79	4,129.00	4,286.57	68.28
74		J236	2.79	4,052.00	4,286.56	101.63
75		J238	2.79	4,049.00	4,286.54	102.92
76		J24	1.61	4,111.00	4,352.73	104.74
77		J240	2.79	4,048.00	4,286.53	103.35
78		J242	2.79	4,077.00	4,286.52	90.79
79		J244	2.79	4,085.00	4,286.54	87.33
80		J246	2.79	4,063.00	4,286.43	96.81
81		J248	2.79	4,063.00	4,286.46	96.83
82		J250	2.79	4,040.00	4,286.47	106.80
83		J252	2.79	4,036.00	4,286.43	108.51
84		J254	2.79	4,038.00	4,286.39	107.63
85		J256	2.79	4,075.00	4,286.41	91.60
86		J258	1.61	4,104.00	4,352.73	107.77
87		J26	1.61	4,128.00	4,352.74	97.38
88		J260	2.79	4,029.00	4,286.35	111.51
89		J262	2.79	4,023.00	4,286.35	114.11
90		J264	2.79	4,020.00	4,286.35	115.41
91		J266	2.79	3,980.00	4,286.34	132.74
92		J268	2.79	3,975.00	4,286.34	134.90
93		J270	2.79	3,976.00	4,286.34	134.47
94		J272	2.79	3,999.00	4,286.34	124.50
95		J274	2.79	4,047.12	4,286.54	103.74
96		J278	1.61	4,148.00	4,352.75	88.72
97		J28	1.61	4,129.00	4,352.74	96.94
98		J280	1.61	4,142.00	4,352.75	91.32
99		J282	1.61	4,131.00	4,352.74	96.08
100		J284	1.61	4,130.00	4,352.74	96.51
101		J286	1.61	4,127.80	4,352.74	97.47
102		J288	1.61	4,187.12	4,352.78	71.78

PEAK DAY DEMAND

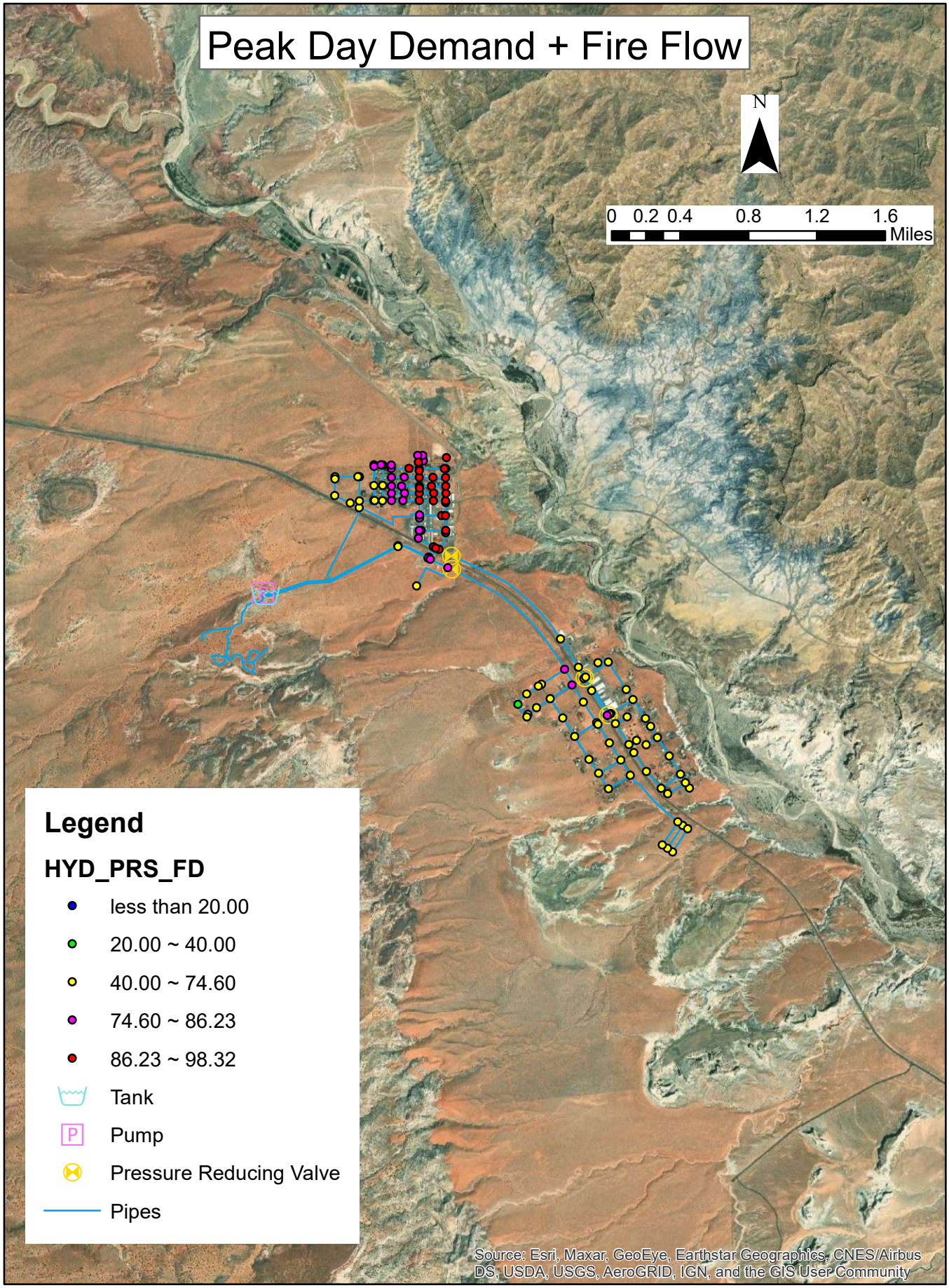
		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
103	☐	J290	2.79	3,998.00	4,286.34	124.94
104	☐	J292	2.79	3,994.00	4,286.34	126.67
105	☐	J294	2.79	4,003.00	4,286.34	122.77
106	☐	J296	2.79	4,014.00	4,286.34	118.00
107	☐	J298	2.79	4,019.00	4,286.34	115.84
108	☐	J30	1.61	4,130.00	4,352.74	96.51
109	☐	J300	2.79	4,024.00	4,286.34	113.67
110	☐	J302	0.00	4,330.00	4,353.96	10.38
111	☐	J304	0.00	4,331.00	4,353.96	9.95
112	☐	J306	0.00	4,336.00	4,617.17	121.83
113	☐	J308	0.00	4,342.00	4,617.17	119.23
114	☐	J310	0.00	4,349.00	4,617.17	116.20
115	☐	J312	0.00	4,357.00	4,617.17	112.73
116	☐	J314	0.00	4,370.00	4,617.17	107.10
117	☐	J316	0.00	4,388.00	4,617.17	99.30
118	☐	J318	0.00	4,394.00	4,617.17	96.70
119	☐	J32	1.61	4,128.00	4,352.74	97.38
120	☐	J320	0.00	4,402.00	4,617.17	93.23
121	☐	J322	0.00	4,413.00	4,617.17	88.46
122	☐	J326	0.00	4,425.00	4,617.16	83.26
123	☐	J328	0.00	4,430.00	4,617.16	81.10
124	☐	J330	0.00	4,433.00	4,617.16	79.80
125	☐	J332	0.00	4,450.00	4,617.16	72.43
126	☐	J334	0.00	4,473.00	4,617.16	62.46
127	☐	J336	0.00	4,492.00	4,617.16	54.23
128	☐	J338	1.21	4,499.00	4,617.16	51.20
129	☐	J34	1.61	4,128.00	4,352.74	97.38
130	☐	J340	0.00	4,454.00	4,617.15	70.69
131	☐	J342	0.00	4,456.00	4,617.14	69.82
132	☐	J344	0.00	4,466.00	4,617.12	65.48
133	☐	J346	0.00	4,464.00	4,617.11	66.34
134	☐	J348	0.00	4,472.00	4,617.06	62.86
135	☐	J350	0.00	4,476.00	4,617.05	61.12
136	☐	J352	0.00	4,476.00	4,617.04	61.11
137	☐	J354	0.00	4,476.00	4,617.03	61.11
138	☐	J356	0.00	4,475.00	4,617.03	61.54
139	☐	J36	1.61	4,110.00	4,352.73	105.18
140	☐	J362	0.00	4,477.00	4,617.04	60.68
141	☐	J366	0.06	4,498.00	4,617.04	51.58
142	☐	J368	0.06	4,502.00	4,617.04	49.85
143	☐	J370	0.06	4,502.00	4,617.04	49.85
144	☐	J372	0.06	4,502.00	4,617.04	49.85
145	☐	J374	0.06	4,497.00	4,617.04	52.01
146	☐	J376	0.06	4,492.00	4,617.04	54.18
147	☐	J378	0.06	4,496.00	4,617.04	52.45
148	☐	J38	1.61	4,107.00	4,352.73	106.48
149	☐	J380	0.06	4,484.00	4,617.04	57.65
150	☐	J382	0.46	4,470.00	4,617.02	63.70
151	☐	J384	0.00	4,465.00	4,617.02	65.87
152	☐	J386	0.00	4,461.00	4,617.02	67.60
153	☐	J388	0.00	4,456.00	4,617.01	69.77

PEAK DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
154	☐	J390	0.00	4,454.00	4,617.01	70.63
155	☐	J392	0.00	4,457.00	4,617.00	69.33
156	☐	J394	0.04	4,454.00	4,617.00	70.63
157	☐	J396	0.04	4,439.00	4,617.00	77.13
158	☐	J398	0.04	4,427.00	4,617.00	82.33
159	☐	J40	1.61	4,103.00	4,352.73	108.21
160	☐	J400	0.04	4,434.00	4,617.00	79.29
161	☐	J402	0.04	4,415.00	4,617.00	87.53
162	☐	J404	0.04	4,409.00	4,617.00	90.13
163	☐	J406	0.04	4,400.00	4,617.00	94.03
164	☐	J408	0.04	4,394.00	4,617.00	96.63
165	☐	J410	0.04	4,412.00	4,617.00	88.83
166	☐	J412	0.04	4,418.00	4,617.00	86.23
167	☐	J414	0.04	4,427.00	4,617.00	82.33
168	☐	J416	0.04	4,429.00	4,617.00	81.46
169	☐	J418	0.04	4,440.00	4,617.00	76.69
170	☐	J42	1.61	4,103.00	4,352.73	108.21
171	☐	J420	0.03	4,461.00	4,617.00	67.60
172	☐	J422	0.03	4,461.00	4,617.00	67.60
173	☐	J424	0.03	4,461.00	4,617.00	67.60
174	☐	J426	0.03	4,459.00	4,617.00	68.46
175	☐	J428	0.03	4,456.00	4,617.00	69.76
176	☐	J430	0.03	4,418.00	4,617.00	86.23
177	☐	J432	0.04	4,451.00	4,617.00	71.93
178	☐	J434	0.04	4,450.00	4,617.00	72.36
179	☐	J436	0.04	4,444.00	4,617.00	74.96
180	☐	J438	0.04	4,438.00	4,617.00	77.56
181	☐	J44	1.61	4,113.00	4,352.73	103.88
182	☐	J440	0.04	4,438.00	4,617.00	77.56
183	☐	J442	0.00	4,451.00	4,617.16	72.00
184	☐	J444	0.00	4,476.00	4,617.04	61.11
185	☐	J446	0.06	4,482.00	4,617.04	58.51
186	☐	J448	0.04	4,410.00	4,617.00	89.69
187	☐	J450	0.04	4,445.00	4,617.00	74.53
188	☐	J452	0.04	4,438.00	4,617.00	77.56
189	☐	J456	0.03	4,439.00	4,617.00	77.13
190	☐	J46	1.61	4,123.00	4,352.73	99.54
191	☐	J48	1.61	4,101.00	4,352.73	109.08
192	☐	J50	1.61	4,122.00	4,352.73	99.98
193	☐	J52	1.61	4,116.00	4,352.73	102.58
194	☐	J54	1.61	4,098.00	4,352.73	110.37
195	☐	J56	1.61	4,096.00	4,352.73	111.24
196	☐	J58	1.61	4,112.00	4,352.73	104.31
197	☐	J60	1.61	4,109.00	4,352.73	105.61
198	☐	J62	1.61	4,092.00	4,352.73	112.97
199	☐	J64	1.61	4,092.00	4,352.73	112.97
200	☐	J66	1.61	4,108.00	4,352.73	106.04
201	☐	J68	1.61	4,102.00	4,352.73	108.64
202	☐	J70	1.61	4,110.00	4,352.73	105.17
203	☐	J72	1.61	4,109.00	4,352.73	105.61
204	☐	J74	1.61	4,119.00	4,352.73	101.28

PEAK DAY DEMAND

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
205	☐	J76	1.61	4,134.00	4,352.73	94.78
206	☐	J78	1.61	4,139.00	4,352.73	92.61
207	☐	J80	1.61	4,142.00	4,352.73	91.31
208	☐	J82	1.61	4,142.00	4,352.73	91.31
209	☐	J84	1.61	4,143.00	4,352.73	90.88
210	☐	J86	1.61	4,135.00	4,352.73	94.34
211	☐	J88	1.61	4,131.00	4,352.73	96.08
212	☐	J90	1.61	4,132.00	4,352.73	95.64
213	☐	J92	1.61	4,126.00	4,352.73	98.24
214	☐	J94	1.61	4,117.00	4,352.73	102.14
215	☐	J96	1.61	4,130.00	4,352.73	96.51
216	☐	J98	1.61	4,143.00	4,352.74	90.88


Peak Day Demand + Fire Flow
N
0 0.2 0.4 0.8 1.2 1.6
Miles
Legend
HYD_PRS_FD
less than 20.00
20.00 ~ 40.00
40.00 ~ 74.60
74.60 ~ 86.23
86.23 ~ 98.32
Tank
Pump
Pressure Reducing Valve
Pipes
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PEAK DAY DEMAND + FIRE FLOW

		ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)
1	☐	J100	1.61	80.92	4,352.74	1,000.00	69.08
2	☐	J102	1.61	85.25	4,352.74	1,000.00	73.31
3	☐	J104	1.61	93.48	4,352.73	1,000.00	80.94
4	☐	J106	1.61	80.92	4,352.74	1,000.00	69.04
5	☐	J108	1.61	86.55	4,352.74	1,000.00	73.69
6	☐	J110	1.61	82.21	4,352.74	1,000.00	69.26
7	☐	J112	1.61	114.27	4,352.73	1,000.00	90.02
8	☐	J114	1.61	108.21	4,352.73	1,000.00	83.59
9	☐	J116	1.61	108.64	4,352.73	1,000.00	79.30
10	☐	J118	1.61	108.21	4,352.73	1,000.00	83.16
11	☐	J120	1.61	93.48	4,352.73	1,000.00	80.81
12	☐	J122	1.61	90.45	4,352.74	1,000.00	77.41
13	☐	J124	1.61	71.83	4,352.78	1,000.00	60.67
14	☐	J126	1.61	71.40	4,352.77	1,000.00	59.97
15	☐	J128	1.61	73.13	4,352.77	1,000.00	59.67
16	☐	J130	1.61	67.50	4,352.77	1,000.00	53.54
17	☐	J132	1.61	64.90	4,352.78	1,000.00	51.35
18	☐	J134	1.61	66.63	4,352.77	1,000.00	52.69
19	☐	J136	1.61	71.83	4,352.77	1,000.00	58.30
20	☐	J138	1.61	66.63	4,352.78	1,000.00	54.18
21	☐	J14	1.61	75.72	4,352.94	1,000.00	64.56
22	☐	J144	1.61	75.35	4,352.90	1,000.00	64.06
23	☐	J146	1.61	94.28	4,352.75	1,000.00	83.10
24	☐	J148	1.61	99.52	4,352.68	1,000.00	83.75
25	☐	J150	1.61	86.09	4,352.68	1,000.00	59.84
26	☐	J152	1.61	95.65	4,352.74	1,000.00	84.53
27	☐	J154	1.61	99.11	4,352.74	1,000.00	88.58
28	☐	J156	1.10	104.17	4,287.42	1,000.00	66.71
29	☐	J158	1.10	107.47	4,287.03	1,000.00	70.50
30	☐	J16	1.61	94.81	4,352.81	1,000.00	83.87
31	☐	J160	1.10	109.14	4,286.89	1,000.00	73.08
32	☐	J162	1.10	70.00	4,197.55	1,000.00	69.33
33	☐	J164	1.10	82.13	4,197.55	1,000.00	72.40
34	☐	J166	1.10	76.06	4,197.55	1,000.00	54.30
35	☐	J168	1.10	80.40	4,197.55	1,000.00	70.57
36	☐	J170	1.10	81.26	4,197.54	1,000.00	73.88
37	☐	J174	1.10	82.56	4,197.54	1,000.00	66.71
38	☐	J176	1.10	84.73	4,197.54	1,000.00	66.47
39	☐	J178	1.10	86.89	4,197.54	1,000.00	66.01
40	☐	J18	1.61	99.56	4,352.76	1,000.00	88.99
41	☐	J180	1.10	84.29	4,197.54	1,000.00	51.82
42	☐	J182	1.10	89.06	4,197.54	1,000.00	65.60
43	☐	J186	1.10	90.36	4,197.53	1,000.00	66.21
44	☐	J188	1.10	92.09	4,197.53	1,000.00	58.72
45	☐	J190	1.10	91.22	4,197.53	1,000.00	63.70
46	☐	J192	1.10	77.79	4,197.53	1,000.00	50.60
47	☐	J194	1.10	78.66	4,197.53	1,000.00	54.57
48	☐	J196	1.10	76.49	4,197.54	1,000.00	53.97
49	☐	J198	1.10	76.93	4,197.54	1,000.00	58.12
50	☐	J20	1.61	99.11	4,352.73	1,000.00	88.29
51	☐	J200	1.10	76.06	4,197.54	1,000.00	59.54

PEAK DAY DEMAND + FIRE FLOW

		ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)
52	☐	J202	1.10	77.79	4,197.54	1,000.00	59.47
53	☐	J204	1.10	73.03	4,197.55	1,000.00	65.61
54	☐	J206	1.10	77.80	4,197.55	1,000.00	67.54
55	☐	J208	1.10	69.57	4,197.55	1,000.00	67.93
56	☐	J210	1.10	70.00	4,197.55	1,000.00	69.35
57	☐	J212	1.10	108.13	4,286.55	1,000.00	79.04
58	☐	J214	1.10	108.66	4,286.77	1,000.00	74.27
59	☐	J216	2.79	100.35	4,286.61	1,000.00	77.96
60	☐	J218	2.79	104.25	4,286.59	1,000.00	80.38
61	☐	J22	1.61	105.18	4,352.73	1,000.00	94.06
62	☐	J220	2.79	89.94	4,286.57	1,000.00	63.75
63	☐	J222	2.79	91.25	4,286.59	1,000.00	66.02
64	☐	J224	2.79	90.38	4,286.59	1,000.00	64.94
65	☐	J226	2.79	79.55	4,286.58	1,000.00	53.44
66	☐	J228	2.79	65.24	4,286.58	1,000.00	38.74
67	☐	J230	2.79	69.14	4,286.57	1,000.00	42.50
68	☐	J232	2.79	77.37	4,286.57	1,000.00	50.80
69	☐	J234	2.79	68.28	4,286.57	1,000.00	41.07
70	☐	J236	2.79	101.63	4,286.56	1,000.00	72.54
71	☐	J238	2.79	102.92	4,286.54	1,000.00	74.60
72	☐	J24	1.61	104.74	4,352.73	1,000.00	93.67
73	☐	J240	2.79	103.35	4,286.53	1,000.00	73.73
74	☐	J242	2.79	90.79	4,286.52	1,000.00	59.95
75	☐	J244	2.79	87.33	4,286.54	1,000.00	56.26
76	☐	J246	2.79	96.81	4,286.43	1,000.00	54.52
77	☐	J248	2.79	96.83	4,286.46	1,000.00	57.02
78	☐	J250	2.79	106.80	4,286.47	1,000.00	68.35
79	☐	J252	2.79	108.51	4,286.43	1,000.00	66.27
80	☐	J254	2.79	107.63	4,286.39	1,000.00	61.09
81	☐	J256	2.79	91.60	4,286.41	1,000.00	45.23
82	☐	J258	1.61	107.77	4,352.73	1,000.00	88.51
83	☐	J26	1.61	97.38	4,352.74	1,000.00	85.95
84	☐	J28	1.61	96.95	4,352.74	1,000.00	85.62
85	☐	J290	2.79	124.94	4,286.34	1,000.00	63.63
86	☐	J292	2.79	126.67	4,286.34	1,000.00	64.71
87	☐	J294	2.79	122.77	4,286.34	1,000.00	62.22
88	☐	J296	2.79	118.00	4,286.34	1,000.00	55.76
89	☐	J298	2.79	115.84	4,286.34	1,000.00	53.99
90	☐	J30	1.61	96.51	4,352.74	1,000.00	84.63
91	☐	J300	2.79	113.67	4,286.34	1,000.00	51.67
92	☐	J32	1.61	97.38	4,352.74	1,000.00	86.09
93	☐	J34	1.61	97.38	4,352.74	1,000.00	86.23
94	☐	J36	1.61	105.18	4,352.73	1,000.00	93.58
95	☐	J38	1.61	106.48	4,352.73	1,000.00	95.12
96	☐	J40	1.61	108.21	4,352.73	1,000.00	96.46
97	☐	J42	1.61	108.21	4,352.73	1,000.00	96.47
98	☐	J44	1.61	103.88	4,352.73	1,000.00	91.75
99	☐	J46	1.61	99.54	4,352.73	1,000.00	88.05
100	☐	J48	1.61	109.08	4,352.73	1,000.00	96.66
101	☐	J50	1.61	99.98	4,352.73	1,000.00	87.88
102	☐	J52	1.61	102.58	4,352.73	1,000.00	90.09

PEAK DAY DEMAND + FIRE FLOW

		ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)
103	☐	J54	1.61	110.37	4,352.73	1,000.00	97.51
104	☐	J56	1.61	111.24	4,352.73	1,000.00	97.84
105	☐	J58	1.61	104.31	4,352.73	1,000.00	91.47
106	☐	J60	1.61	105.61	4,352.73	1,000.00	92.14
107	☐	J62	1.61	112.97	4,352.73	1,000.00	98.30
108	☐	J64	1.61	112.97	4,352.73	1,000.00	98.32
109	☐	J66	1.61	106.04	4,352.73	1,000.00	92.28
110	☐	J68	1.61	108.64	4,352.73	1,000.00	95.10
111	☐	J70	1.61	105.17	4,352.73	1,000.00	92.08
112	☐	J72	1.61	105.61	4,352.73	1,000.00	92.89
113	☐	J74	1.61	101.28	4,352.73	1,000.00	88.45
114	☐	J76	1.61	94.78	4,352.73	1,000.00	82.02
115	☐	J78	1.61	92.61	4,352.73	1,000.00	79.52
116	☐	J80	1.61	91.31	4,352.73	1,000.00	78.46
117	☐	J82	1.61	91.31	4,352.73	1,000.00	78.81
118	☐	J84	1.61	90.88	4,352.73	1,000.00	78.91
119	☐	J86	1.61	94.34	4,352.73	1,000.00	82.06
120	☐	J88	1.61	96.08	4,352.73	1,000.00	83.29
121	☐	J90	1.61	95.64	4,352.73	1,000.00	82.51
122	☐	J92	1.61	98.24	4,352.73	1,000.00	84.85
123	☐	J94	1.61	102.14	4,352.73	1,000.00	88.59
124	☐	J96	1.61	96.51	4,352.73	1,000.00	83.76
125	☐	J98	1.61	90.88	4,352.74	1,000.00	77.89

PEAK DAY DEMAND + FIRE FLOW

		ID	Hydrant Available Flow (gpm)	Hydrant Pressure at Available Flow (psi)
1	☐	J100	2,668.50	20.00
2	☐	J102	2,761.11	20.00
3	☐	J104	2,861.43	20.00
4	☐	J106	2,661.90	20.00
5	☐	J108	2,655.39	20.00
6	☐	J110	2,542.52	20.00
7	☐	J112	2,168.17	20.00
8	☐	J114	2,071.86	20.00
9	☐	J116	1,871.02	20.00
10	☐	J118	2,050.56	20.00
11	☐	J120	2,841.15	20.00
12	☐	J122	2,720.07	20.00
13	☐	J124	2,516.66	20.00
14	☐	J126	2,469.08	20.00
15	☐	J128	2,255.46	20.00
16	☐	J130	2,065.26	20.00
17	☐	J132	2,037.69	20.00
18	☐	J134	2,044.56	20.00
19	☐	J136	2,216.10	20.00
20	☐	J138	2,201.13	20.00
21	☐	J14	2,582.87	20.00
22	☐	J144	2,567.88	20.00
23	☐	J146	3,108.51	20.00
24	☐	J148	2,623.25	20.00
25	☐	J150	1,714.20	20.00
26	☐	J152	3,158.03	20.00
27	☐	J154	3,360.59	20.00
28	☐	J156	1,566.83	20.00
29	☐	J158	1,621.29	20.00
30	☐	J16	3,136.51	20.00
31	☐	J160	1,657.81	20.00
32	☐	J162	1,809.42	20.00
33	☐	J164	1,723.26	20.00
34	☐	J166	1,443.64	20.00
35	☐	J168	1,710.70	20.00
36	☐	J170	1,770.23	20.00
37	☐	J174	1,611.51	20.00
38	☐	J176	1,584.78	20.00
39	☐	J178	1,552.63	20.00
40	☐	J18	3,347.88	20.00
41	☐	J180	1,353.59	20.00
42	☐	J182	1,523.80	20.00
43	☐	J186	1,522.13	20.00
44	☐	J188	1,397.75	20.00
45	☐	J190	1,474.21	20.00
46	☐	J192	1,375.18	20.00
47	☐	J194	1,429.21	20.00
48	☐	J196	1,435.78	20.00
49	☐	J198	1,503.87	20.00
50	☐	J20	3,306.76	20.00
51	☐	J200	1,540.31	20.00

PEAK DAY DEMAND + FIRE FLOW

		ID	Hydrant Available Flow (gpm)	Hydrant Pressure at Available Flow (psi)
52	☐	J202	1,520.30	20.00
53	☐	J204	1,697.99	20.00
54	☐	J206	1,676.68	20.00
55	☐	J208	1,806.42	20.00
56	☐	J210	1,835.76	20.00
57	☐	J212	1,817.61	20.00
58	☐	J214	1,690.16	20.00
59	☐	J216	1,928.69	20.00
60	☐	J218	1,921.87	20.00
61	☐	J22	3,378.17	20.00
62	☐	J220	1,712.55	20.00
63	☐	J222	1,749.67	20.00
64	☐	J224	1,734.86	20.00
65	☐	J226	1,596.95	20.00
66	☐	J228	1,367.84	20.00
67	☐	J230	1,432.57	20.00
68	☐	J232	1,560.62	20.00
69	☐	J234	1,400.53	20.00
70	☐	J236	1,751.32	20.00
71	☐	J238	1,792.03	20.00
72	☐	J24	3,377.17	20.00
73	☐	J240	1,762.02	20.00
74	☐	J242	1,608.87	20.00
75	☐	J244	1,562.15	20.00
76	☐	J246	1,414.15	20.00
77	☐	J248	1,464.32	20.00
78	☐	J250	1,595.15	20.00
79	☐	J252	1,534.90	20.00
80	☐	J254	1,443.16	20.00
81	☐	J256	1,288.25	20.00
82	☐	J258	2,399.98	20.00
83	☐	J26	3,133.38	20.00
84	☐	J28	3,143.51	20.00
85	☐	J290	1,362.57	20.00
86	☐	J292	1,366.79	20.00
87	☐	J294	1,356.36	20.00
88	☐	J296	1,299.49	20.00
89	☐	J298	1,287.89	20.00
90	☐	J30	3,029.13	20.00
91	☐	J300	1,269.62	20.00
92	☐	J32	3,160.65	20.00
93	☐	J34	3,188.74	20.00
94	☐	J36	3,279.07	20.00
95	☐	J38	3,355.46	20.00
96	☐	J40	3,315.84	20.00
97	☐	J42	3,319.30	20.00
98	☐	J44	3,153.60	20.00
99	☐	J46	3,174.92	20.00
100	☐	J48	3,214.37	20.00
101	☐	J50	3,077.09	20.00
102	☐	J52	3,069.07	20.00

PEAK DAY DEMAND + FIRE FLOW

		ID	Hydrant Available Flow (gpm)	Hydrant Pressure at Available Flow (psi)
103	☐	J54	3,165.06	20.00
104	☐	J56	3,097.53	20.00
105	☐	J58	3,048.37	20.00
106	☐	J60	2,979.36	20.00
107	☐	J62	2,948.50	20.00
108	☐	J64	2,950.90	20.00
109	☐	J66	2,944.11	20.00
110	☐	J68	3,025.66	20.00
111	☐	J70	3,024.05	20.00
112	☐	J72	3,090.81	20.00
113	☐	J74	2,985.71	20.00
114	☐	J76	2,858.15	20.00
115	☐	J78	2,762.48	20.00
116	☐	J80	2,767.48	20.00
117	☐	J82	2,817.10	20.00
118	☐	J84	2,889.62	20.00
119	☐	J86	2,917.83	20.00
120	☐	J88	2,878.95	20.00
121	☐	J90	2,819.96	20.00
122	☐	J92	2,839.34	20.00
123	☐	J94	2,896.16	20.00
124	☐	J96	2,896.46	20.00
125	☐	J98	2,735.65	20.00

PIPE REPORT

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
1		P101	J26	J28	59.57	8.00	140.00	-11.56	0.07	0.00
2		P103	J24	J38	460.14	8.00	140.00	0.53	0.00	0.00
3		P105	J38	J36	117.69	8.00	140.00	-7.83	0.05	0.00
4		P107	J36	J34	687.85	8.00	140.00	-9.44	0.06	0.00
5		P109	J38	J40	402.96	8.00	140.00	6.75	0.04	0.00
6		P111	J40	J42	52.62	8.00	140.00	5.14	0.03	0.00
7		P113	J42	J44	378.14	8.00	140.00	-4.28	0.03	0.00
8		P115	J44	J46	435.59	8.00	140.00	-5.89	0.04	0.00
9		P117	J48	J72	376.29	8.00	140.00	-0.14	0.00	0.00
10		P119	J72	J50	443.98	8.00	140.00	-1.75	0.01	0.00
11		P121	J54	J70	443.98	8.00	140.00	0.51	0.00	0.00
12		P123	J70	J52	373.75	8.00	140.00	-1.10	0.01	0.00
13		P125	J56	J68	388.87	8.00	140.00	-0.65	0.00	0.00
14		P127	J68	J58	426.43	8.00	140.00	-2.26	0.01	0.00
15		P129	J62	J64	45.15	8.00	140.00	0.04	0.00	0.00
16		P13	RES9000	J302	99.96	8.00	140.00	132.27	0.84	0.04
17		P131	J64	J60	772.57	8.00	140.00	-1.57	0.01	0.00
18		P133	J60	J94	319.40	8.00	140.00	-7.54	0.05	0.00
19		P135	J94	J76	544.31	8.00	140.00	-9.15	0.06	0.00
20		P137	J58	J92	459.83	8.00	140.00	-3.64	0.02	0.00
21		P139	J92	J78	396.33	8.00	140.00	-5.25	0.03	0.00
22		P141	J52	J90	545.11	8.00	140.00	-1.32	0.01	0.00
23		P143	J90	J80	313.54	8.00	140.00	-2.93	0.02	0.00
24		P145	J50	J88	462.34	8.00	140.00	-0.91	0.01	0.00
25		P147	J88	J82	396.35	8.00	140.00	-2.52	0.02	0.00
26		P149	J46	J86	500.82	8.00	140.00	-4.09	0.03	0.00
27		P15	J10	J12	748.89	8.00	140.00	127.40	0.81	0.26
28		P151	J86	J84	353.68	8.00	140.00	-5.70	0.04	0.00
29		P153	J84	J102	278.44	8.00	140.00	-17.79	0.11	0.00
30		P155	J102	J108	469.16	8.00	140.00	10.13	0.06	0.00
31		P157	J108	J104	629.01	8.00	140.00	8.52	0.05	0.00
32		P159	J76	J96	107.81	8.00	140.00	-15.81	0.10	0.00
33		P161	J96	J104	260.88	8.00	140.00	-17.42	0.11	0.00
34		P163	J104	J120	60.56	8.00	140.00	-10.51	0.07	0.00
35		P165	J120	J98	213.08	8.00	140.00	-12.12	0.08	0.00
36		P167	J98	J122	42.30	8.00	140.00	-13.73	0.09	0.00
37		P169	J122	J110	589.93	8.00	140.00	-15.34	0.10	0.00
38		P17	J12	J14	2,347.99	8.00	140.00	76.60	0.49	0.32
39		P171	J110	J100	463.45	8.00	140.00	-16.95	0.11	0.00
40		P173	J100	J106	28.48	8.00	140.00	31.14	0.20	0.00
41		P175	J106	J102	242.58	8.00	140.00	29.53	0.19	0.01
42		P177	J100	J126	441.47	8.00	140.00	-49.70	0.32	0.03
43		P179	J124	J288	26.23	8.00	140.00	74.21	0.47	0.00
44		P181	J126	J128	747.04	8.00	140.00	-6.90	0.04	0.00
45		P183	J128	J136	48.94	8.00	140.00	-8.51	0.05	0.00
46		P185	J136	J130	705.18	8.00	140.00	-10.12	0.06	0.00
47		P187	J130	J134	66.64	8.00	140.00	-11.73	0.07	0.00
48		P189	J134	J132	512.65	8.00	140.00	-13.34	0.09	0.00
49		P19	J14	J16	1,028.88	8.00	140.00	74.99	0.48	0.14
50		P191	J132	J138	525.88	8.00	140.00	-14.95	0.10	0.00
51		P193	J138	J124	318.01	8.00	140.00	-16.56	0.11	0.00

PIPE REPORT

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
52		P195	J124	J12	2,485.52	8.00	140.00	-92.37	0.59	0.48
53		P197	J12	J142	48.21	8.00	140.00	-43.18	0.28	0.00
54		P199	J156	J158	1,035.93	6.00	140.00	61.94	0.70	0.39
55		P203	J160	V8006	34.35	6.00	140.00	8.49	0.10	0.00
56		P205	J162	J164	845.10	6.00	140.00	5.57	0.06	0.00
57		P207	J164	J166	428.71	6.00	140.00	1.10	0.01	0.00
58		P209	J160	J214	444.73	6.00	140.00	51.24	0.58	0.12
59		P21	J16	J18	349.12	8.00	140.00	73.38	0.47	0.04
60		P211	J214	J212	903.78	6.00	140.00	50.14	0.57	0.23
61		P213	J164	J168	1,012.82	6.00	140.00	3.37	0.04	0.00
62		P215	J168	J170	374.01	6.00	140.00	2.27	0.03	0.00
63		P217	J212	V8008	39.98	6.00	140.00	16.81	0.19	0.00
64		P219	J210	J208	48.42	6.00	140.00	7.53	0.09	0.00
65		P221	J208	J170	809.32	6.00	140.00	6.43	0.07	0.00
66		P223	J210	J162	1,355.77	6.00	140.00	-1.83	0.02	0.00
67		P225	J210	J204	346.82	6.00	140.00	10.00	0.11	0.00
68		P227	J204	J200	769.87	6.00	140.00	7.80	0.09	0.01
69		P229	J204	J206	410.55	8.00	140.00	1.10	0.01	0.00
70		P23	RES9000	J140	1,322.63	8.00	140.00	128.24	0.82	0.47
71		P231	J200	J202	260.86	8.00	140.00	1.10	0.01	0.00
72		P233	J200	J198	290.53	6.00	140.00	5.60	0.06	0.00
73		P235	J198	J196	696.28	6.00	140.00	4.50	0.05	0.00
74		P237	J196	J194	695.73	6.00	140.00	3.40	0.04	0.00
75		P239	J194	J192	258.88	6.00	140.00	1.64	0.02	0.00
76		P241	J190	J192	645.79	6.00	140.00	-0.54	0.01	0.00
77		P243	J194	J186	744.73	8.00	140.00	0.65	0.00	0.00
78		P245	J188	J190	208.22	6.00	140.00	-1.10	0.01	0.00
79		P247	J190	J186	304.74	6.00	140.00	-1.66	0.02	0.00
80		P249	J186	J182	658.90	6.00	140.00	-2.10	0.02	0.00
81		P25	J140	J142	763.07	8.00	140.00	126.63	0.81	0.26
82		P251	J182	J178	673.75	6.00	140.00	-3.20	0.04	0.00
83		P253	J178	J180	413.12	6.00	140.00	1.10	0.01	0.00
84		P255	J178	J176	408.47	6.00	140.00	-5.40	0.06	0.00
85		P257	J176	J174	287.93	6.00	140.00	-6.50	0.07	0.00
86		P259	J174	J170	699.74	6.00	140.00	-7.60	0.09	0.01
87		P261	J216	J222	851.66	8.00	140.00	27.67	0.18	0.02
88		P263	J222	J224	110.12	8.00	140.00	24.88	0.16	0.00
89		P265	J224	J226	431.03	8.00	140.00	22.09	0.14	0.01
90		P267	J226	J228	442.21	8.00	140.00	19.30	0.12	0.00
91		P269	J228	J230	460.71	8.00	140.00	16.51	0.11	0.00
92		P27	J142	J144	2,343.80	8.00	140.00	81.83	0.52	0.36
93		P271	J230	J232	345.18	8.00	140.00	10.93	0.07	0.00
94		P273	J232	J220	503.60	8.00	140.00	8.14	0.05	0.00
95		P275	J216	J218	602.18	8.00	140.00	34.95	0.22	0.02
96		P277	J218	J236	638.54	6.00	140.00	18.98	0.22	0.03
97		P279	J218	J220	793.13	6.00	140.00	13.18	0.15	0.02
98		P281	J230	J234	80.36	8.00	140.00	2.79	0.02	0.00
99		P283	J220	J244	705.20	6.00	140.00	18.53	0.21	0.03
100		P285	J244	J242	678.52	6.00	140.00	15.74	0.18	0.02
101		P287	J236	J238	757.70	6.00	140.00	16.19	0.18	0.02
102		P289	J238	J274	62.45	6.00	140.00	-29.45	0.33	0.01

PIPE REPORT

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
103		P29	J144	J146	1,006.67	8.00	140.00	80.22	0.51	0.15
104		P291	J242	J238	801.81	6.00	140.00	-12.24	0.14	0.01
105		P293	J238	J240	62.50	6.00	140.00	30.61	0.35	0.01
106		P295	J240	J250	673.12	6.00	140.00	27.82	0.32	0.06
107		P297	J250	J252	636.68	6.00	140.00	25.03	0.28	0.04
108		P299	J242	J248	833.70	6.00	140.00	25.19	0.29	0.06
109		P301	J248	J246	526.24	6.00	140.00	22.40	0.25	0.03
110		P303	J246	J252	794.55	4.00	140.00	2.14	0.05	0.00
111		P305	J246	J256	566.06	6.00	140.00	17.47	0.20	0.02
112		P307	J256	J254	792.92	6.00	140.00	14.68	0.17	0.02
113		P309	J254	J252	551.77	6.00	140.00	-24.38	0.28	0.04
114		P31	J146	J152	79.98	8.00	140.00	78.61	0.50	0.01
115		P311	J20	V8000	424.72	6.00	140.00	63.04	0.72	0.16
116		P313	J148	V8002	135.57	8.00	140.00	65.41	0.42	0.01
117		P317	J158	J160	383.51	6.00	140.00	60.84	0.69	0.14
118		P319	V8006	J162	34.17	6.00	140.00	8.49	0.10	0.00
119		P321	V8008	J210	31.92	6.00	140.00	16.81	0.19	0.00
120		P323	J254	J260	284.14	6.00	140.00	36.27	0.41	0.04
121		P325	J260	J262	122.06	10.00	140.00	33.48	0.14	0.00
122		P327	J262	J264	465.60	10.00	140.00	30.69	0.13	0.00
123		P329	J264	J266	453.13	10.00	140.00	27.90	0.11	0.00
124		P33	J152	J154	382.14	8.00	140.00	8.37	0.05	0.00
125		P331	J266	J268	240.75	10.00	140.00	25.11	0.10	0.00
126		P333	J268	J270	39.46	10.00	140.00	22.32	0.09	0.00
127		P335	J270	J272	239.01	10.00	140.00	19.53	0.08	0.00
128		P337	J274	J212	337.22	10.00	130.00	-32.24	0.13	0.00
129		P339	J286	J46	425.22	8.00	140.00	12.78	0.08	0.00
130		P343	J278	J280	243.06	8.00	140.00	26.57	0.17	0.00
131		P345	J280	J282	554.70	8.00	140.00	24.96	0.16	0.01
132		P347	J282	J284	71.18	8.00	140.00	23.35	0.15	0.00
133		P349	J284	J286	270.94	8.00	140.00	21.74	0.14	0.00
134		P35	J154	J20	107.02	8.00	140.00	58.44	0.37	0.01
135		P351	J288	J126	185.77	8.00	140.00	44.41	0.28	0.01
136		P353	J288	J278	1,165.98	8.00	140.00	28.18	0.18	0.02
137		P355	J272	J294	241.13	8.00	140.00	16.74	0.11	0.00
138		P357	J294	J300	855.16	8.00	140.00	4.67	0.03	0.00
139		P359	J300	J298	189.40	8.00	140.00	1.88	0.01	0.00
140		P361	J298	J296	193.58	8.00	140.00	1.38	0.01	0.00
141		P363	J290	J298	851.22	8.00	140.00	2.28	0.01	0.00
142		P365	J296	J292	855.22	8.00	140.00	-1.41	0.01	0.00
143		P367	J294	J290	186.68	8.00	140.00	9.28	0.06	0.00
144		P369	J290	J292	185.63	8.00	140.00	4.20	0.03	0.00
145		P37	J152	J148	600.85	8.00	140.00	68.63	0.44	0.07
146		P371	J302	J10	1,215.09	8.00	140.00	129.01	0.82	0.44
147		P39	J148	J150	1,513.59	8.00	140.00	1.61	0.01	0.00
148		P41	J20	J22	562.18	8.00	140.00	-6.20	0.04	0.00
149		P43	J22	J24	68.87	8.00	140.00	-7.81	0.05	0.00
150		P45	V8000	J156	4,322.77	6.00	140.00	63.04	0.72	1.67
151		P47	V8002	J216	4,748.46	8.00	140.00	65.41	0.42	0.48
152		P489	J456	J430	121.50	1.50	150.00	0.03	0.01	0.00
153		P49	J42	J48	229.45	6.00	140.00	7.81	0.09	0.00

PIPE REPORT

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
154		P507	U7000	J306	64.46	4.00	150.00	3.26	0.08	0.00
155		P509	J306	J308	112.60	4.00	150.00	3.26	0.08	0.00
156		P51	J48	J54	220.69	6.00	140.00	6.34	0.07	0.00
157		P511	J308	J310	82.73	4.00	150.00	3.26	0.08	0.00
158		P513	J310	J312	120.77	4.00	150.00	3.26	0.08	0.00
159		P515	J312	J314	168.47	4.00	150.00	3.26	0.08	0.00
160		P517	J314	J316	217.85	4.00	150.00	3.26	0.08	0.00
161		P519	J316	J318	97.11	4.00	150.00	3.26	0.08	0.00
162		P521	J318	J320	92.49	4.00	150.00	3.26	0.08	0.00
163		P523	J320	J322	104.75	4.00	150.00	3.26	0.08	0.00
164		P525	J322	J326	279.61	4.00	150.00	3.26	0.08	0.00
165		P527	J326	J328	75.38	4.00	150.00	3.26	0.08	0.00
166		P529	J328	J330	79.90	4.00	150.00	3.26	0.08	0.00
167		P53	J54	J56	263.30	6.00	140.00	4.22	0.05	0.00
168		P531	J330	J332	212.92	4.00	150.00	3.26	0.08	0.00
169		P533	J332	J442	22.87	4.00	150.00	3.26	0.08	0.00
170		P535	J442	J334	544.71	4.00	150.00	1.21	0.03	0.00
171		P537	J334	J336	373.79	4.00	150.00	1.21	0.03	0.00
172		P539	J336	J338	144.01	4.00	150.00	1.21	0.03	0.00
173		P541	J442	J340	68.27	2.00	150.00	2.05	0.21	0.01
174		P543	J340	J342	65.93	2.00	150.00	2.05	0.21	0.01
175		P545	J342	J344	166.40	2.00	150.00	2.05	0.21	0.02
176		P547	J344	J346	111.55	2.00	150.00	2.05	0.21	0.01
177		P549	J346	J348	343.21	2.00	150.00	2.05	0.21	0.04
178		P55	J56	J62	278.34	6.00	140.00	3.26	0.04	0.00
179		P551	J348	J350	123.46	2.00	150.00	2.05	0.21	0.02
180		P553	J350	J352	26.97	2.00	150.00	2.05	0.21	0.00
181		P555	J352	J444	40.59	2.00	150.00	2.05	0.21	0.01
182		P557	J444	J354	77.45	2.00	150.00	1.51	0.15	0.01
183		P559	J354	J356	27.19	2.00	150.00	1.51	0.15	0.00
184		P561	J356	J382	128.74	2.00	150.00	1.51	0.15	0.01
185		P563	J382	J384	86.79	2.00	150.00	1.05	0.11	0.00
186		P565	J384	J386	87.43	2.00	150.00	1.05	0.11	0.00
187		P567	J386	J388	103.05	2.00	150.00	1.05	0.11	0.00
188		P569	J388	J390	68.06	2.00	150.00	1.05	0.11	0.00
189		P57	J62	J112	340.93	6.00	140.00	1.61	0.02	0.00
190		P571	J390	J392	164.03	2.00	150.00	1.05	0.11	0.01
191		P573	J392	J394	80.33	2.00	150.00	0.76	0.08	0.00
192		P575	J394	J450	97.49	2.00	150.00	0.72	0.07	0.00
193		P577	J450	J396	44.94	2.00	150.00	0.40	0.04	0.00
194		P579	J396	J452	91.57	2.00	150.00	0.36	0.04	0.00
195		P581	J452	J400	20.21	2.00	150.00	0.20	0.02	0.00
196		P583	J400	J398	89.76	2.00	150.00	0.16	0.02	0.00
197		P585	J398	J402	147.73	2.00	150.00	0.12	0.01	0.00
198		P587	J402	J448	69.94	2.00	150.00	0.08	0.01	0.00
199		P589	J448	J404	23.00	2.00	150.00	0.12	0.01	0.00
200		P59	J154	J18	81.31	6.00	140.00	-51.68	0.59	0.02
201		P591	J404	J406	154.22	2.00	150.00	0.08	0.01	0.00
202		P593	J406	J408	123.11	2.00	150.00	0.04	0.00	0.00
203		P595	J444	J362	25.35	2.00	150.00	0.54	0.06	0.00
204		P597	J362	J446	40.00	2.00	150.00	0.54	0.06	0.00

PIPE REPORT

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
205	☐	P599	J446	J366	290.83	2.00	150.00	0.21	0.02	0.00
206	☐	P601	J366	J368	112.64	2.00	150.00	0.15	0.02	0.00
207	☐	P603	J368	J370	97.81	2.00	150.00	0.09	0.01	0.00
208	☐	P605	J370	J372	116.15	2.00	150.00	0.03	0.00	0.00
209	☐	P607	J372	J374	150.52	2.00	150.00	-0.03	0.00	0.00
210	☐	P609	J374	J378	54.38	2.00	150.00	-0.09	0.01	0.00
211	☐	P61	J18	J30	532.02	6.00	140.00	20.09	0.23	0.02
212	☐	P611	J378	J376	52.98	2.00	150.00	-0.15	0.02	0.00
213	☐	P613	J376	J380	120.52	2.00	150.00	-0.21	0.02	0.00
214	☐	P615	J380	J446	128.07	2.00	150.00	-0.27	0.03	0.00
215	☐	P617	J448	J410	133.82	2.00	150.00	-0.08	0.01	0.00
216	☐	P619	J410	J412	120.58	2.00	150.00	-0.12	0.01	0.00
217	☐	P621	J412	J414	106.59	2.00	150.00	-0.16	0.02	0.00
218	☐	P623	J414	J416	53.60	2.00	150.00	-0.20	0.02	0.00
219	☐	P625	J416	J418	233.87	2.00	150.00	-0.24	0.02	0.00
220	☐	P627	J418	J450	39.66	2.00	150.00	-0.28	0.03	0.00
221	☐	P629	J392	J420	135.26	1.50	150.00	0.29	0.05	0.00
222	☐	P63	J30	J28	245.72	8.00	140.00	18.48	0.12	0.00
223	☐	P631	J420	J422	44.69	1.50	150.00	0.26	0.05	0.00
224	☐	P633	J422	J424	57.67	1.50	150.00	0.23	0.04	0.00
225	☐	P635	J424	J426	74.55	1.50	150.00	0.20	0.04	0.00
226	☐	P637	J426	J428	98.31	1.50	150.00	0.17	0.03	0.00
227	☐	P639	J428	J456	51.46	1.50	150.00	0.14	0.03	0.00
228	☐	P641	J456	J432	25.27	2.00	150.00	0.08	0.01	0.00
229	☐	P643	J432	J434	73.72	2.00	150.00	0.04	0.00	0.00
230	☐	P645	J434	J436	68.52	2.00	150.00	0.00	0.00	0.00
231	☐	P647	J436	J438	102.28	2.00	150.00	-0.04	0.00	0.00
232	☐	P649	J438	J440	58.39	2.00	150.00	-0.08	0.01	0.00
233	☐	P65	J28	J32	382.26	8.00	140.00	5.31	0.03	0.00
234	☐	P651	J440	J452	36.35	2.00	150.00	-0.12	0.01	0.00
235	☐	P653	J302	J304	114.83	4.00	150.00	3.26	0.08	0.00
236	☐	P655	J304	U7000	82.04	4.00	150.00	3.26	0.08	0.00
237	☐	P67	J32	J34	95.46	8.00	140.00	3.70	0.02	0.00
238	☐	P69	J34	J286	17.92	8.00	140.00	-7.35	0.05	0.00
239	☐	P71	J46	J50	226.02	6.00	140.00	9.37	0.11	0.00
240	☐	P73	J50	J74	152.96	6.00	140.00	6.92	0.08	0.00
241	☐	P75	J74	J52	67.88	6.00	140.00	5.31	0.06	0.00
242	☐	P77	J52	J58	268.28	6.00	140.00	3.91	0.04	0.00
243	☐	P79	J58	J66	208.09	6.00	140.00	3.69	0.04	0.00
244	☐	P81	J66	J60	60.22	6.00	140.00	2.08	0.02	0.00
245	☐	P83	J60	J258	204.66	6.00	140.00	6.44	0.07	0.00
246	☐	P85	J258	J114	190.26	6.00	140.00	1.61	0.02	0.00
247	☐	P87	J258	J118	205.17	6.00	140.00	3.22	0.04	0.00
248	☐	P89	J118	J116	152.70	6.00	140.00	1.61	0.02	0.00
249	☐	P91	J84	J82	225.64	6.00	140.00	10.47	0.12	0.00
250	☐	P93	J82	J80	223.15	6.00	140.00	6.35	0.07	0.00
251	☐	P95	J80	J78	268.26	6.00	140.00	1.81	0.02	0.00
252	☐	P97	J78	J76	273.32	6.00	140.00	-5.05	0.06	0.00
253	☐	P99	J24	J26	752.99	8.00	140.00	-9.95	0.06	0.00

PIPE REPORT

		ID	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
1	☐	P101	0.00	Open	0
2	☐	P103	0.00	Open	0
3	☐	P105	0.00	Open	0
4	☐	P107	0.00	Open	0
5	☐	P109	0.00	Open	0
6	☐	P111	0.00	Open	0
7	☐	P113	0.00	Open	0
8	☐	P115	0.00	Open	0
9	☐	P117	0.00	Open	0
10	☐	P119	0.00	Open	0
11	☐	P121	0.00	Open	0
12	☐	P123	0.00	Open	0
13	☐	P125	0.00	Open	0
14	☐	P127	0.00	Open	0
15	☐	P129	0.00	Open	0
16	☐	P13	0.38	Open	0
17	☐	P131	0.00	Open	0
18	☐	P133	0.00	Open	0
19	☐	P135	0.00	Open	0
20	☐	P137	0.00	Open	0
21	☐	P139	0.00	Open	0
22	☐	P141	0.00	Open	0
23	☐	P143	0.00	Open	0
24	☐	P145	0.00	Open	0
25	☐	P147	0.00	Open	0
26	☐	P149	0.00	Open	0
27	☐	P15	0.35	Open	0
28	☐	P151	0.00	Open	0
29	☐	P153	0.01	Open	0
30	☐	P155	0.00	Open	0
31	☐	P157	0.00	Open	0
32	☐	P159	0.01	Open	0
33	☐	P161	0.01	Open	0
34	☐	P163	0.00	Open	0
35	☐	P165	0.00	Open	0
36	☐	P167	0.01	Open	0
37	☐	P169	0.01	Open	0
38	☐	P17	0.14	Open	0
39	☐	P171	0.01	Open	0
40	☐	P173	0.03	Open	0
41	☐	P175	0.02	Open	0
42	☐	P177	0.06	Open	0
43	☐	P179	0.13	Open	0
44	☐	P181	0.00	Open	0
45	☐	P183	0.00	Open	0
46	☐	P185	0.00	Open	0
47	☐	P187	0.00	Open	0
48	☐	P189	0.01	Open	0
49	☐	P19	0.13	Open	0
50	☐	P191	0.01	Open	0
51	☐	P193	0.01	Open	0

PIPE REPORT

		ID	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
52	☐	P195	0.19	Open	0
53	☐	P197	0.05	Open	0
54	☐	P199	0.37	Open	0
55	☐	P203	0.01	Open	0
56	☐	P205	0.00	Open	0
57	☐	P207	0.00	Open	0
58	☐	P209	0.26	Open	0
59	☐	P21	0.13	Open	0
60	☐	P211	0.25	Open	0
61	☐	P213	0.00	Open	0
62	☐	P215	0.00	Open	0
63	☐	P217	0.04	Open	0
64	☐	P219	0.01	Open	0
65	☐	P221	0.01	Open	0
66	☐	P223	0.00	Open	0
67	☐	P225	0.01	Open	0
68	☐	P227	0.01	Open	0
69	☐	P229	0.00	Open	0
70	☐	P23	0.35	Open	0
71	☐	P231	0.00	Open	0
72	☐	P233	0.00	Open	0
73	☐	P235	0.00	Open	0
74	☐	P237	0.00	Open	0
75	☐	P239	0.00	Open	0
76	☐	P241	0.00	Open	0
77	☐	P243	0.00	Open	0
78	☐	P245	0.00	Open	0
79	☐	P247	0.00	Open	0
80	☐	P249	0.00	Open	0
81	☐	P25	0.35	Open	0
82	☐	P251	0.00	Open	0
83	☐	P253	0.00	Open	0
84	☐	P255	0.00	Open	0
85	☐	P257	0.01	Open	0
86	☐	P259	0.01	Open	0
87	☐	P261	0.02	Open	0
88	☐	P263	0.02	Open	0
89	☐	P265	0.01	Open	0
90	☐	P267	0.01	Open	0
91	☐	P269	0.01	Open	0
92	☐	P27	0.15	Open	0
93	☐	P271	0.00	Open	0
94	☐	P273	0.00	Open	0
95	☐	P275	0.03	Open	0
96	☐	P277	0.04	Open	0
97	☐	P279	0.02	Open	0
98	☐	P281	0.00	Open	0
99	☐	P283	0.04	Open	0
100	☐	P285	0.03	Open	0
101	☐	P287	0.03	Open	0
102	☐	P289	0.09	Open	0

PIPE REPORT

		ID	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
103	☐	P29	0.15	Open	0
104	☐	P291	0.02	Open	0
105	☐	P293	0.10	Open	0
106	☐	P295	0.08	Open	0
107	☐	P297	0.07	Open	0
108	☐	P299	0.07	Open	0
109	☐	P301	0.06	Open	0
110	☐	P303	0.00	Open	0
111	☐	P305	0.04	Open	0
112	☐	P307	0.03	Open	0
113	☐	P309	0.07	Open	0
114	☐	P31	0.15	Open	0
115	☐	P311	0.39	Open	0
116	☐	P313	0.10	Open	0
117	☐	P317	0.36	Open	0
118	☐	P319	0.00	Open	0
119	☐	P321	0.03	Open	0
120	☐	P323	0.14	Open	0
121	☐	P325	0.01	Open	0
122	☐	P327	0.01	Open	0
123	☐	P329	0.01	Open	0
124	☐	P33	0.00	Open	0
125	☐	P331	0.01	Open	0
126	☐	P333	0.01	Open	0
127	☐	P335	0.00	Open	0
128	☐	P337	0.01	Open	0
129	☐	P339	0.01	Open	0
130	☐	P343	0.02	Open	0
131	☐	P345	0.02	Open	0
132	☐	P347	0.01	Open	0
133	☐	P349	0.01	Open	0
134	☐	P35	0.08	Open	0
135	☐	P351	0.05	Open	0
136	☐	P353	0.02	Open	0
137	☐	P355	0.01	Open	0
138	☐	P357	0.00	Open	0
139	☐	P359	0.00	Open	0
140	☐	P361	0.00	Open	0
141	☐	P363	0.00	Open	0
142	☐	P365	0.00	Open	0
143	☐	P367	0.00	Open	0
144	☐	P369	0.00	Open	0
145	☐	P37	0.11	Open	0
146	☐	P371	0.36	Open	0
147	☐	P39	0.00	Open	0
148	☐	P41	0.00	Open	0
149	☐	P43	0.00	Open	0
150	☐	P45	0.39	Open	0
151	☐	P47	0.10	Open	0
152	☐	P489	0.00	Open	0
153	☐	P49	0.01	Open	0

PIPE REPORT

		ID	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
154	☐	P507	0.02	Open	0
155	☐	P509	0.01	Open	0
156	☐	P51	0.01	Open	0
157	☐	P511	0.01	Open	0
158	☐	P513	0.01	Open	0
159	☐	P515	0.01	Open	0
160	☐	P517	0.01	Open	0
161	☐	P519	0.01	Open	0
162	☐	P521	0.01	Open	0
163	☐	P523	0.01	Open	0
164	☐	P525	0.01	Open	0
165	☐	P527	0.01	Open	0
166	☐	P529	0.01	Open	0
167	☐	P53	0.00	Open	0
168	☐	P531	0.01	Open	0
169	☐	P533	0.00	Open	0
170	☐	P535	0.00	Open	0
171	☐	P537	0.00	Open	0
172	☐	P539	0.00	Open	0
173	☐	P541	0.13	Open	0
174	☐	P543	0.13	Open	0
175	☐	P545	0.13	Open	0
176	☐	P547	0.13	Open	0
177	☐	P549	0.13	Open	0
178	☐	P55	0.00	Open	0
179	☐	P551	0.13	Open	0
180	☐	P553	0.13	Open	0
181	☐	P555	0.13	Open	0
182	☐	P557	0.07	Open	0
183	☐	P559	0.07	Open	0
184	☐	P561	0.07	Open	0
185	☐	P563	0.03	Open	0
186	☐	P565	0.04	Open	0
187	☐	P567	0.04	Open	0
188	☐	P569	0.04	Open	0
189	☐	P57	0.00	Open	0
190	☐	P571	0.04	Open	0
191	☐	P573	0.02	Open	0
192	☐	P575	0.02	Open	0
193	☐	P577	0.00	Open	0
194	☐	P579	0.01	Open	0
195	☐	P581	0.00	Open	0
196	☐	P583	0.01	Open	0
197	☐	P585	0.00	Open	0
198	☐	P587	0.00	Open	0
199	☐	P589	0.00	Open	0
200	☐	P59	0.27	Open	0
201	☐	P591	0.00	Open	0
202	☐	P593	0.00	Open	0
203	☐	P595	0.00	Open	0
204	☐	P597	0.01	Open	0

PIPE REPORT

		ID	HL/1000 (ft/k-ft)	Status	Flow Reversal Count
205	☐	P599	0.00	Open	0
206	☐	P601	0.00	Open	0
207	☐	P603	0.00	Open	0
208	☐	P605	0.00	Open	0
209	☐	P607	0.00	Open	0
210	☐	P609	0.01	Open	0
211	☐	P61	0.05	Open	0
212	☐	P611	0.00	Open	0
213	☐	P613	0.00	Open	0
214	☐	P615	0.00	Open	0
215	☐	P617	0.00	Open	0
216	☐	P619	0.00	Open	0
217	☐	P621	0.00	Open	0
218	☐	P623	0.00	Open	0
219	☐	P625	0.00	Open	0
220	☐	P627	0.00	Open	0
221	☐	P629	0.01	Open	0
222	☐	P63	0.01	Open	0
223	☐	P631	0.01	Open	0
224	☐	P633	0.01	Open	0
225	☐	P635	0.01	Open	0
226	☐	P637	0.00	Open	0
227	☐	P639	0.00	Open	0
228	☐	P641	0.00	Open	0
229	☐	P643	0.00	Open	0
230	☐	P645	0.00	Open	0
231	☐	P647	0.00	Open	0
232	☐	P649	0.00	Open	0
233	☐	P65	0.00	Open	0
234	☐	P651	0.00	Open	0
235	☐	P653	0.01	Open	0
236	☐	P655	0.01	Open	0
237	☐	P67	0.01	Open	0
238	☐	P69	0.03	Open	0
239	☐	P71	0.01	Open	0
240	☐	P73	0.01	Open	0
241	☐	P75	0.01	Open	0
242	☐	P77	0.00	Open	0
243	☐	P79	0.00	Open	0
244	☐	P81	0.00	Open	0
245	☐	P83	0.00	Open	0
246	☐	P85	0.00	Open	0
247	☐	P87	0.00	Open	0
248	☐	P89	0.00	Open	0
249	☐	P91	0.02	Open	0
250	☐	P93	0.00	Open	0
251	☐	P95	0.00	Open	0
252	☐	P97	0.00	Open	0
253	☐	P99	0.00	Open	0